US009363570B2

(12) **United States Patent**
Cho et al.

(10) **Patent No.: US 9,363,570 B2**
(45) **Date of Patent: Jun. 7, 2016**

(54) **BROADCAST RECEIVING APPARATUS FOR RECEIVING A SHARED HOME SCREEN**

(71) Applicant: **LG ELECTRONICS INC.**, Seoul (KR)

(72) Inventors: **Youngjoo Cho**, Seoul (KR); **Jinsu Jung**, Seoul (KR)

(73) Assignee: **LG ELECTRONICS INC.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/277,419**

(22) Filed: **May 14, 2014**

(65) **Prior Publication Data**

US 2014/0344862 A1 Nov. 20, 2014

(30) **Foreign Application Priority Data**

May 15, 2013 (KR) 10-2013-0054803
May 24, 2013 (KR) 10-2013-0058701

(51) **Int. Cl.**

H04N 21/485 (2011.01)
H04N 21/482 (2011.01)
H04N 21/475 (2011.01)
H04N 21/422 (2011.01)
H04N 21/431 (2011.01)

(52) **U.S. Cl.**

CPC ***H04N 21/4826*** (2013.01); ***H04N 21/4222*** (2013.01); ***H04N 21/42209*** (2013.01); ***H04N 21/431*** (2013.01); ***H04N 21/4753*** (2013.01); ***H04N 21/4858*** (2013.01)

(58) **Field of Classification Search**

CPC H04N 21/42204; H04N 21/42208; H04N 21/42209; H04N 21/4222; H04N 21/4753; H04N 21/4854; H04N 21/4858

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2005/0091539 A1* 4/2005 Wang et al. 713/201
2010/0257473 A1* 10/2010 Kang G06F 3/1454 715/769
2012/0081312 A1* 4/2012 Sirpal et al. 345/173
2012/0088548 A1* 4/2012 Yun G08C 17/02 455/557
2012/0178496 A1* 7/2012 Hwang et al. 455/550.1
2013/0023339 A1* 1/2013 Davis G07F 17/3206 463/29
2014/0053189 A1* 2/2014 Lee et al. 725/37
2014/0075377 A1* 3/2014 Kang et al. 715/788
2015/0163537 A1* 6/2015 Sirpal et al. 725/37

* cited by examiner

Primary Examiner — James R Sheleheda
Assistant Examiner — Alexander Boyd
(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

Disclosed are a broadcast receiving apparatus and a method for operating the same. A broadcast receiving apparatus according to an embodiment of the present invention includes an interface to access an electronic device that stores home screen information including a background image and a plurality of execution items, and to receive the home screen information from the electronic device, a controller to scale at least one of the background image and the execution items of the received home screen information, and a display to display a home screen including the scaled background image and execution items. As such, user convenience may be improved.

13 Claims, 37 Drawing Sheets

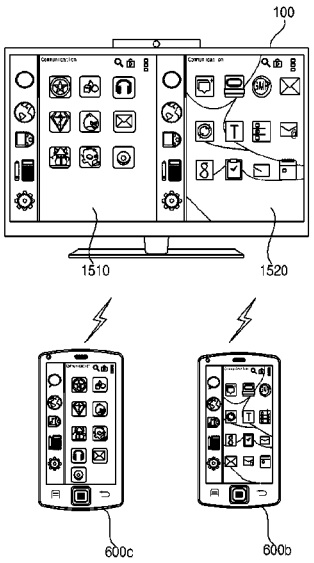


FIG. 1A

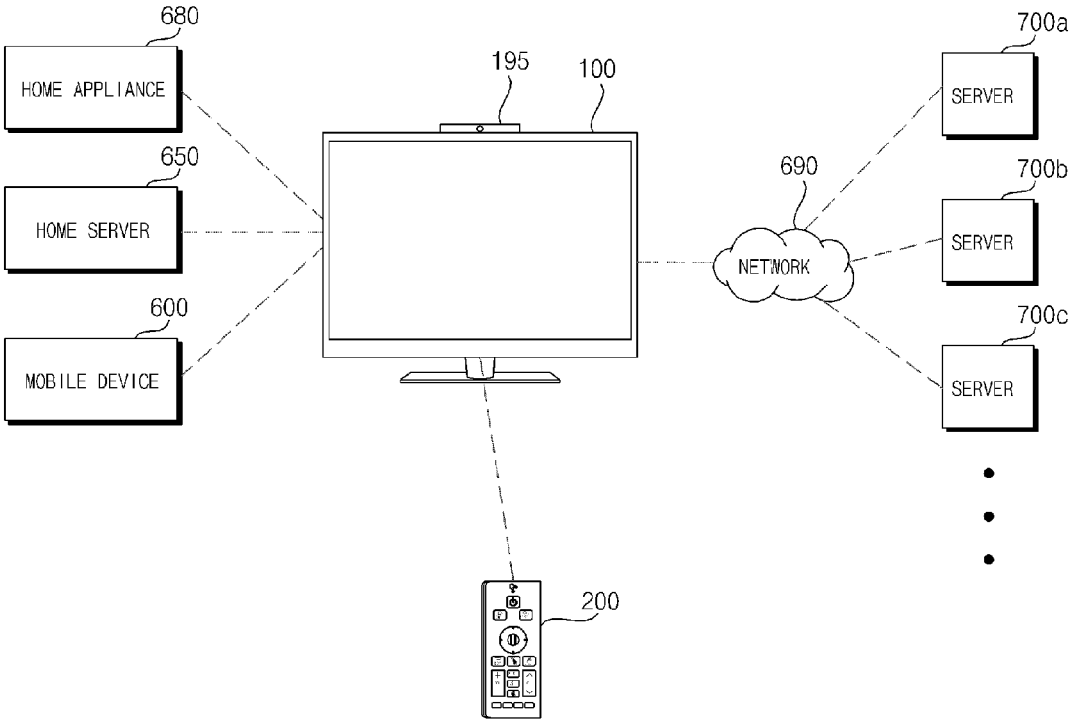

680
HOME APPLIANCE
650
HOME SERVER
600
MOBILE DEVICE
195
100
690
NETWORK
700a
SERVER
700b
SERVER
700c
SERVER
200

FIG. 1B

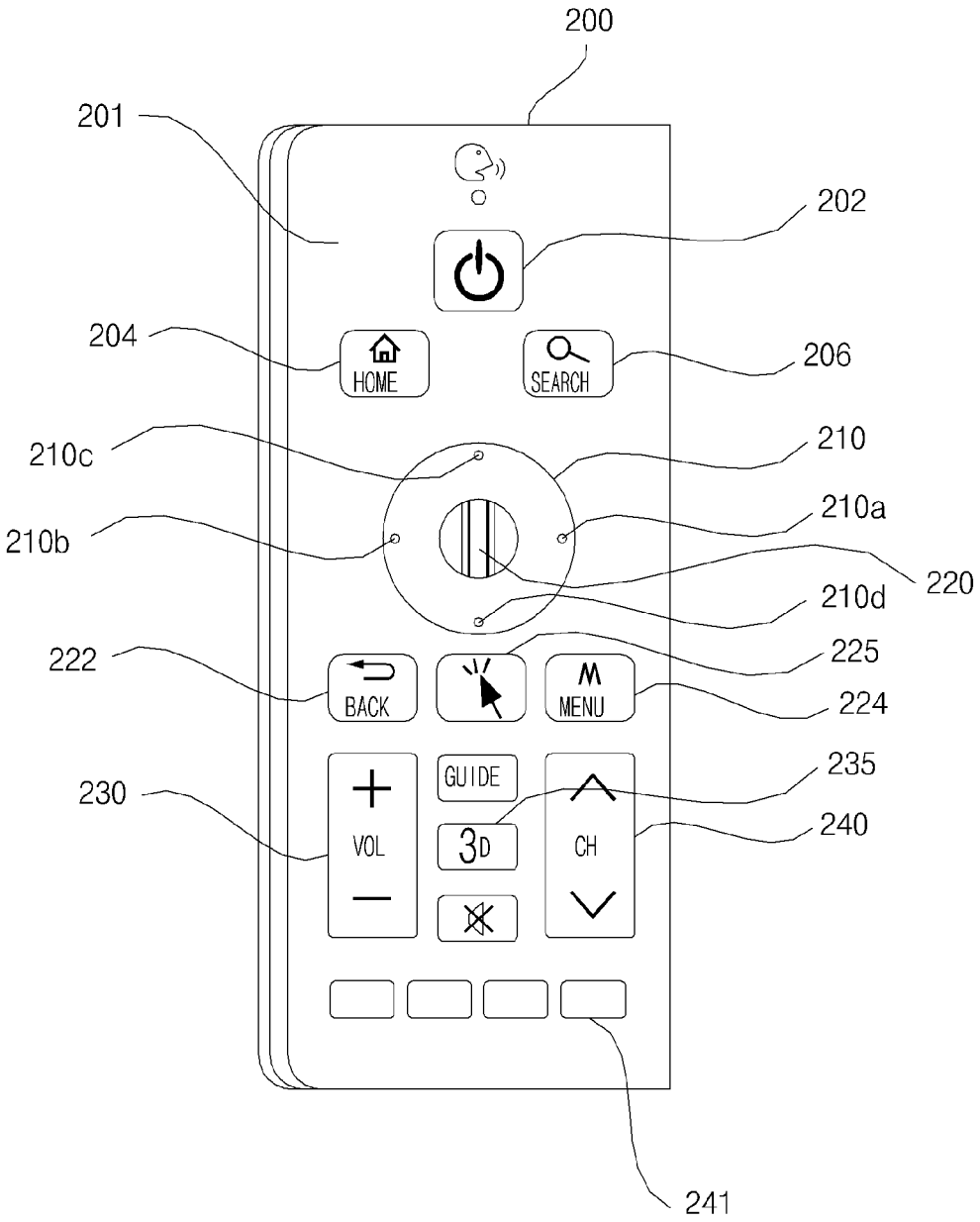

200
201
202
204
HOME
SEARCH
206
210c
210
210a
210b
220
210d
222
225
BACK
MENU
224
230
GUIDE
235
3D
CH
240
VOL
241

FIG. 1C

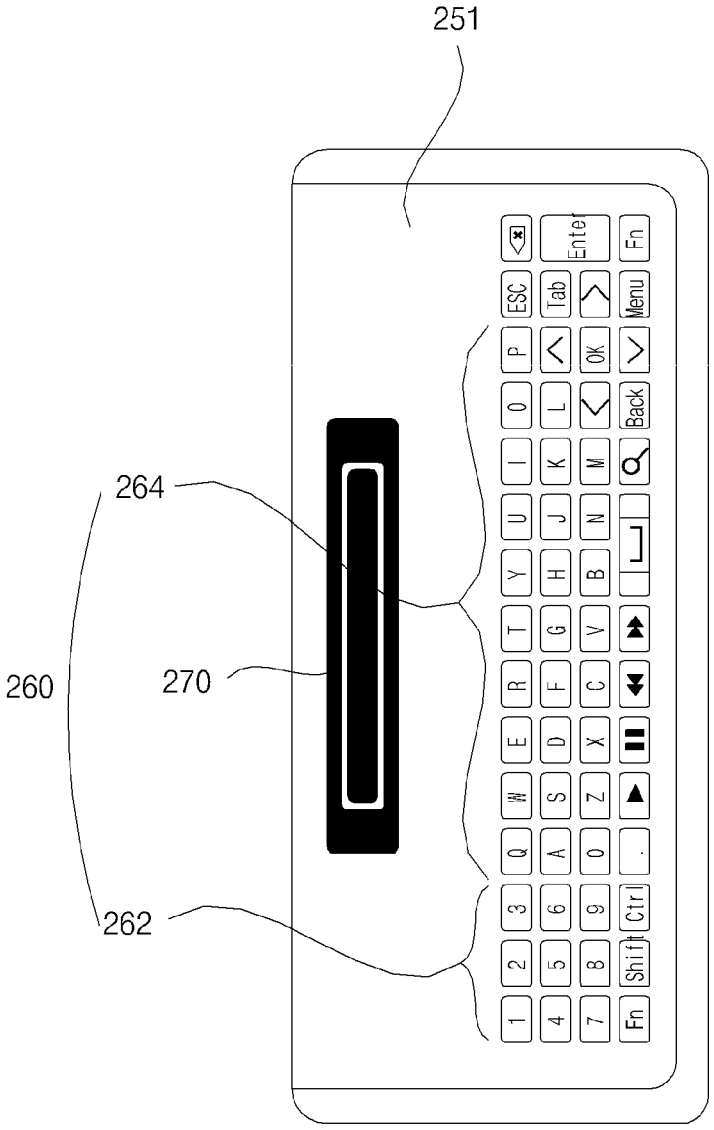

251
264
260
270
262
Enter
Fn
ESC
Tab
Menu
P
OK
0
L
Back
I
K
M
U
J
N
Y
H
B
T
G
V
R
F
C
E
D
X
W
S
Z
Q
A
0
3
6
9
Ctrl
2
5
8
Shift
1
4
7
Fn

FIG. 2

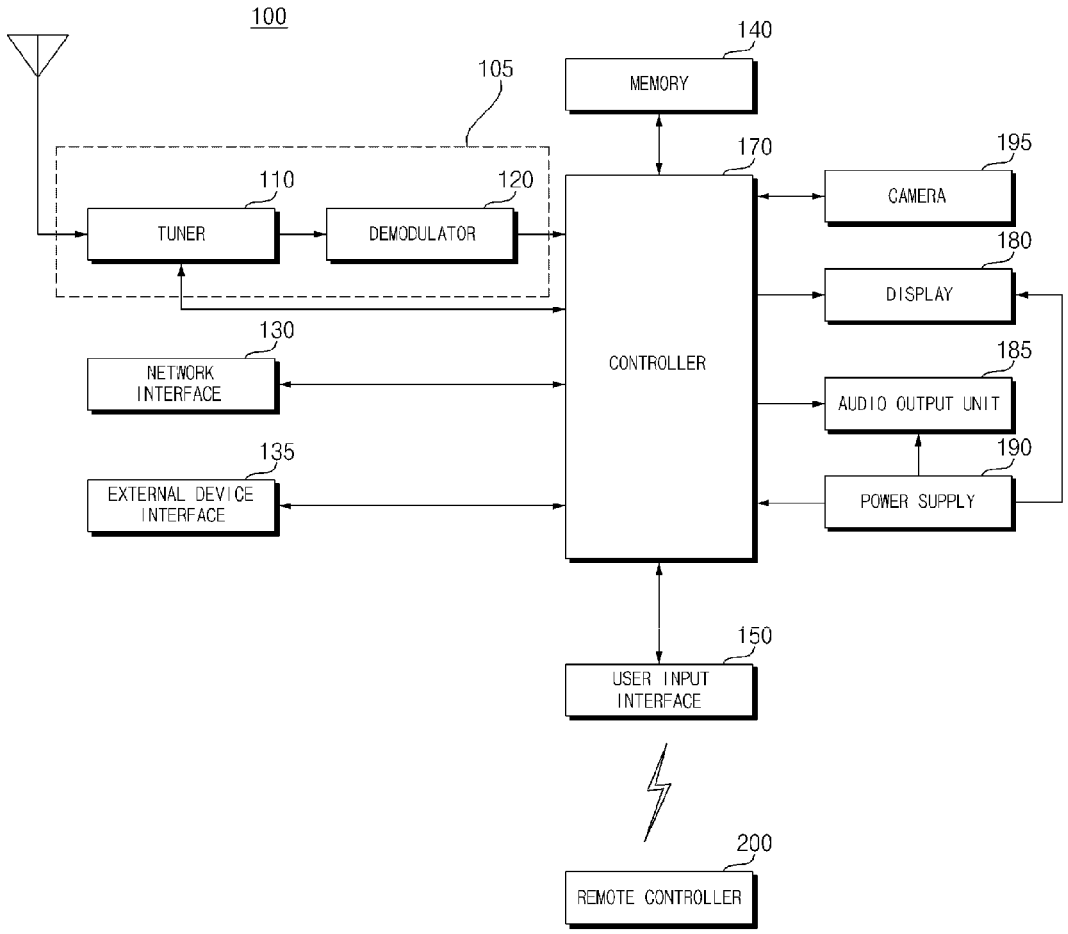

100
105
140
MEMORY
170
195
CAMERA
110
120
TUNER
DEMODULATOR
180
DISPLAY
130
NETWORK INTERFACE
CONTROLLER
185
AUDIO OUTPUT UNIT
135
EXTERNAL DEVICE INTERFACE
190
POWER SUPPLY
150
USER INPUT INTERFACE
200
REMOTE CONTROLLER

FIG. 3

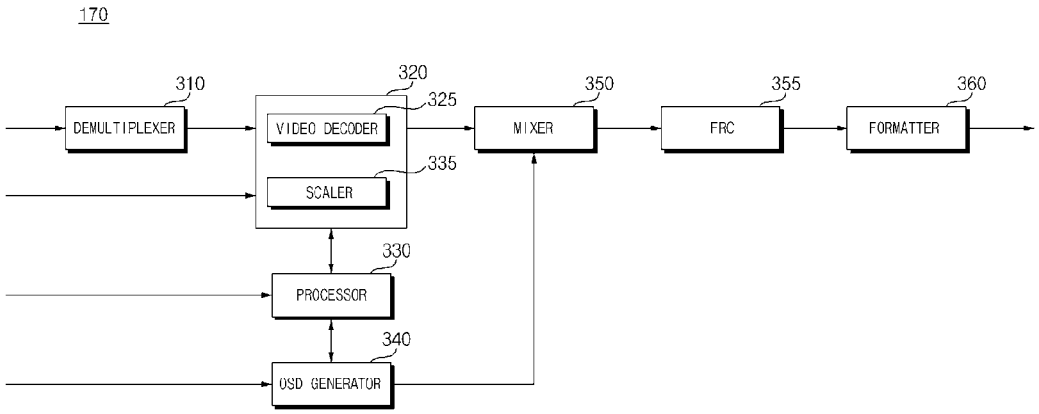

170
310
320
325
350
355
360
DEMULTIPLEXER
VIDEO DECODER
MIXER
FRC
FORMATTER
335
SCALER
330
PROCESSOR
340
OSD GENERATOR

FIG. 4

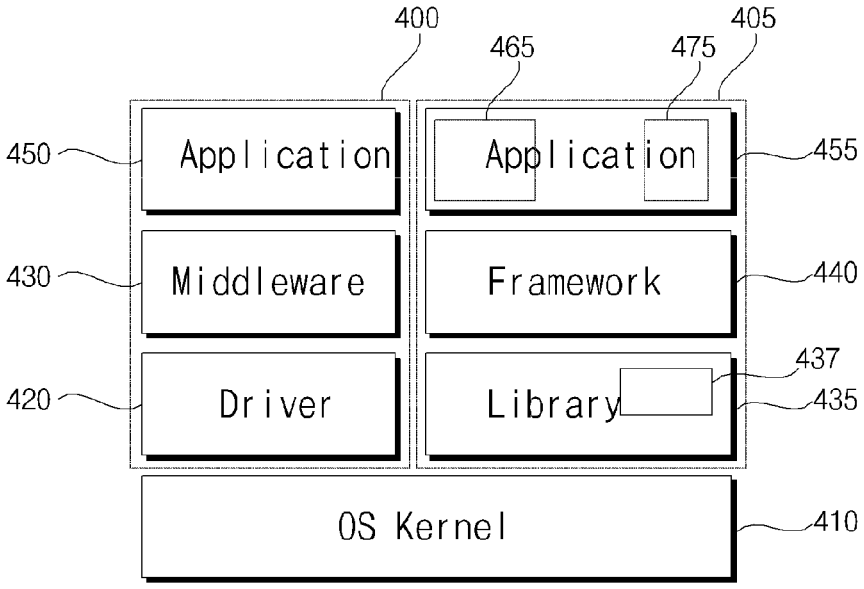

400
465
475
405
450
Application
Application
455
430
Middleware
Framework
440
437
420
Driver
Library
435
OS Kernel
410

FIG. 5

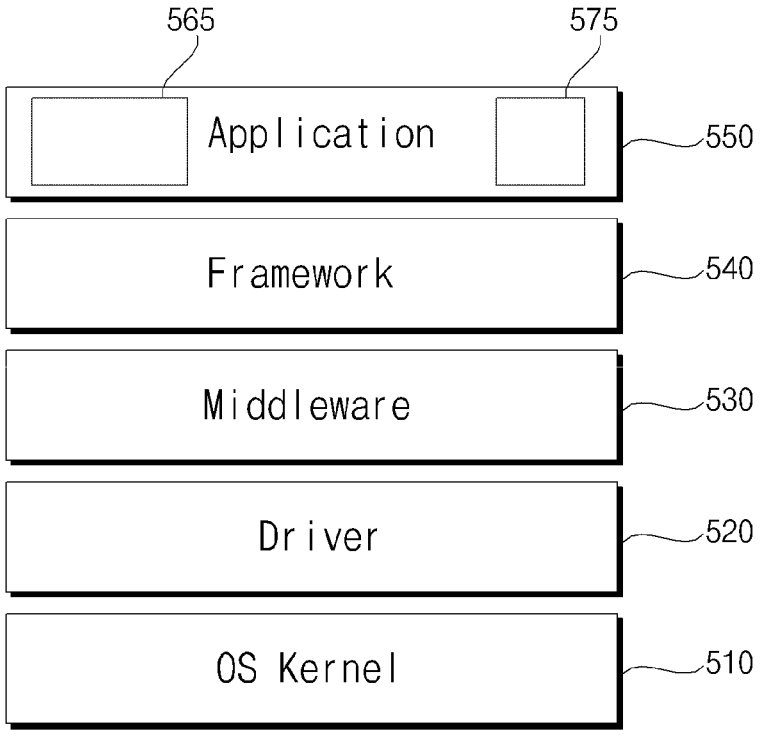

565
575
Application
550
Framework
540
Middleware
530
Driver
520
OS Kernel
510

FIG. 6A

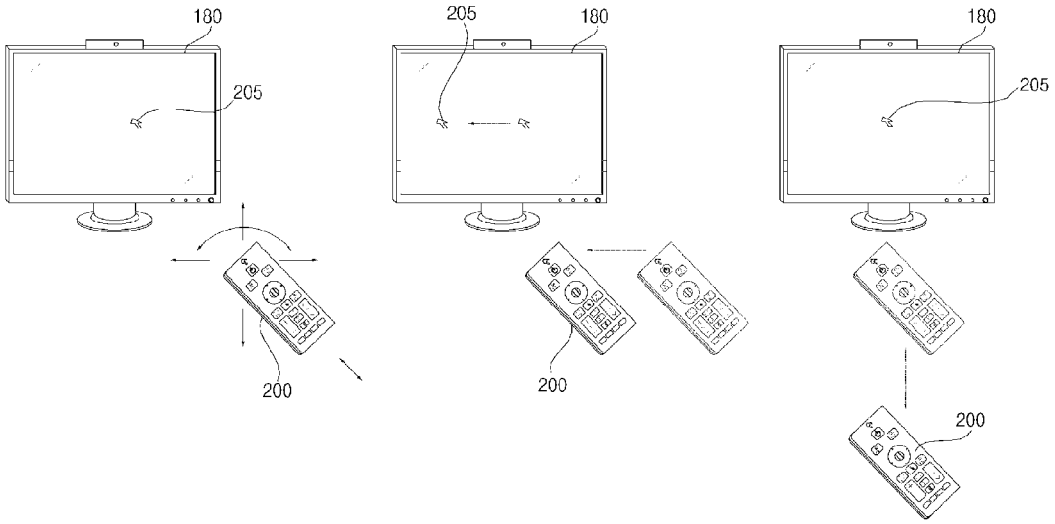


FIG. 6B

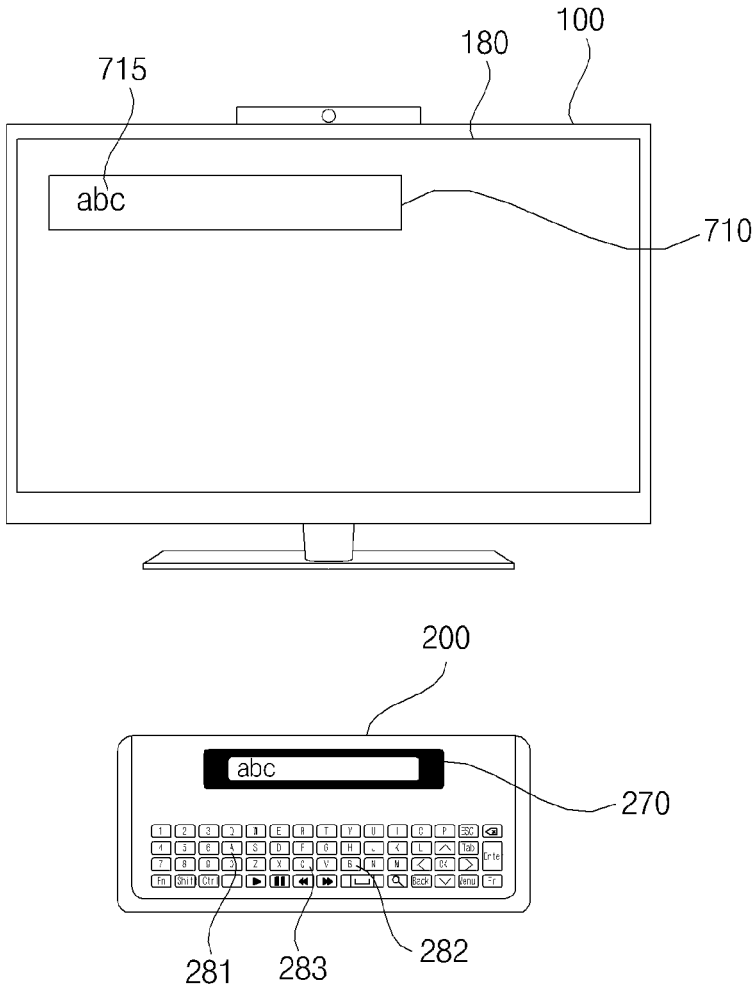


FIG. 7

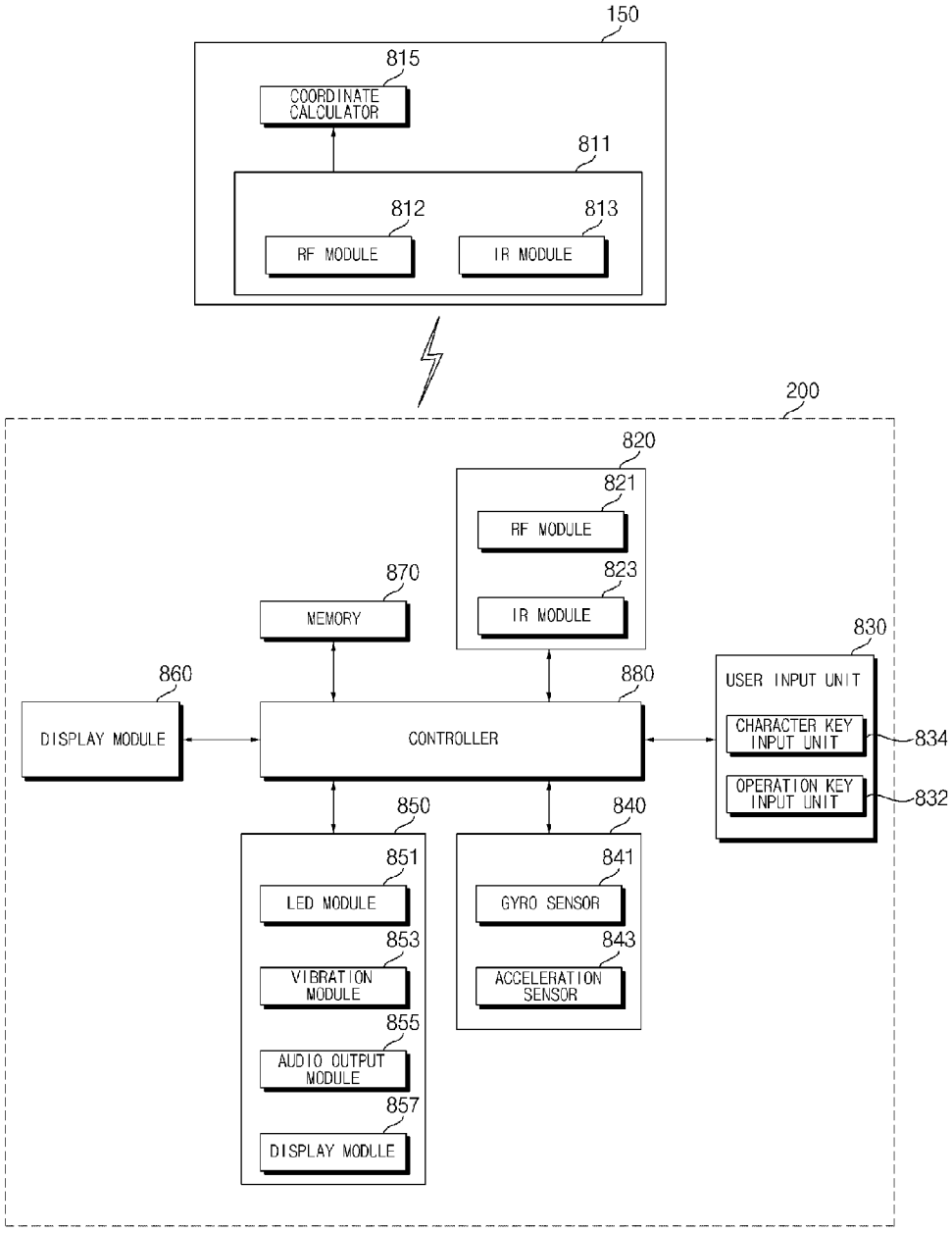

150
815
COORDINATE CALCULATOR
811
812
RF MODULE
813
IR MODULE
200
820
821
RF MODULE
823
IR MODULE
870
MEMORY
860
DISPLAY MODULE
880
CONTROLLER
830
USER INPUT UNIT
CHARACTER KEY INPUT UNIT
834
OPERATION KEY INPUT UNIT
832
850
851
LED MODULE
853
VIBRATION MODULE
855
AUDIO OUTPUT MODULE
857
DISPLAY MODULE
840
841
GYRO SENSOR
843
ACCELERATION SENSOR

FIG. 8

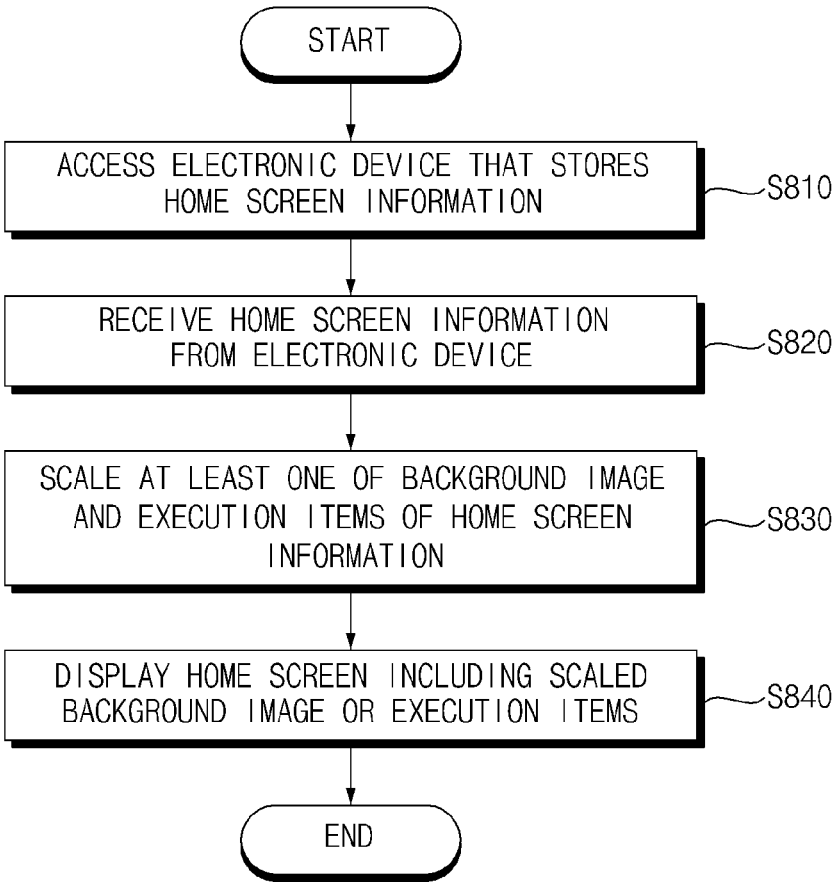

START
ACCESS ELECTRONIC DEVICE THAT STORES HOME SCREEN INFORMATION
S810
RECEIVE HOME SCREEN INFORMATION FROM ELECTRONIC DEVICE
S820
SCALE AT LEAST ONE OF BACKGROUND IMAGE AND EXECUTION ITEMS OF HOME SCREEN INFORMATION
S830
DISPLAY HOME SCREEN INCLUDING SCALED BACKGROUND IMAGE OR EXECUTION ITEMS
S840
END

FIG. 9

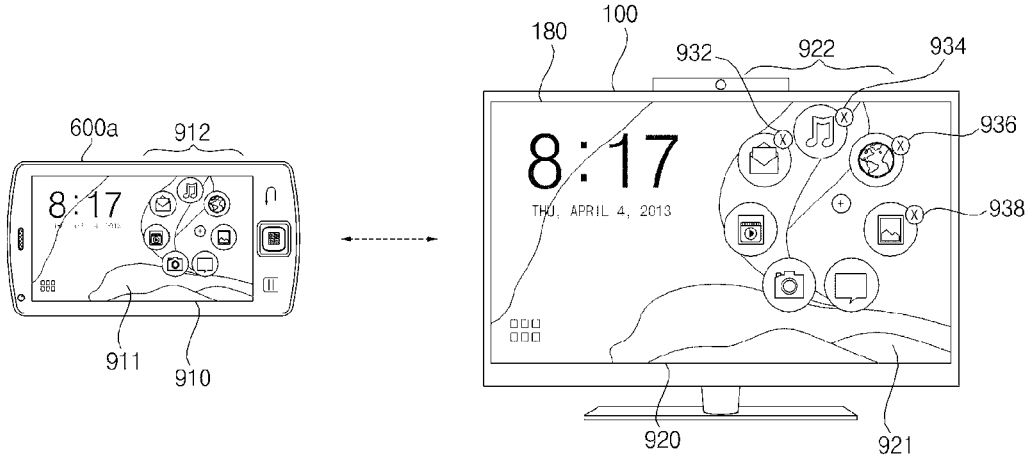

600a
912
8:17
911
910
180
100
932
922
934
936
938
8:17
THU, APRIL 4, 2013
920
921
(a)
(b)

FIG. 10

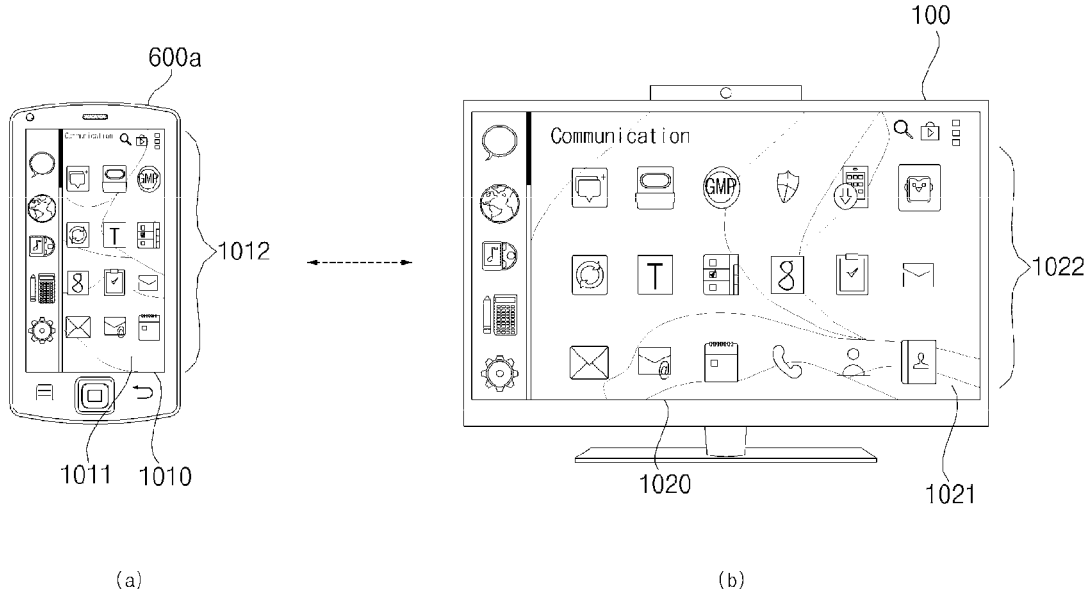

600a
1012
1011
1010
100
Communication
GMP
1022
1020
1021
(a)
(b)

FIG. 11A

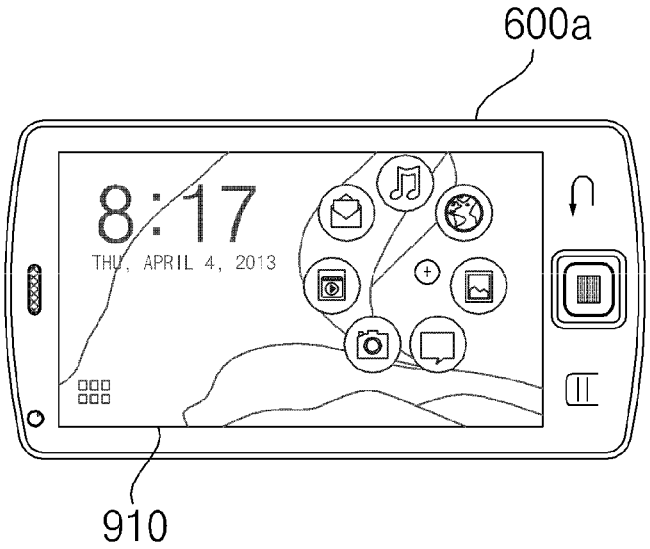


FIG. 11B

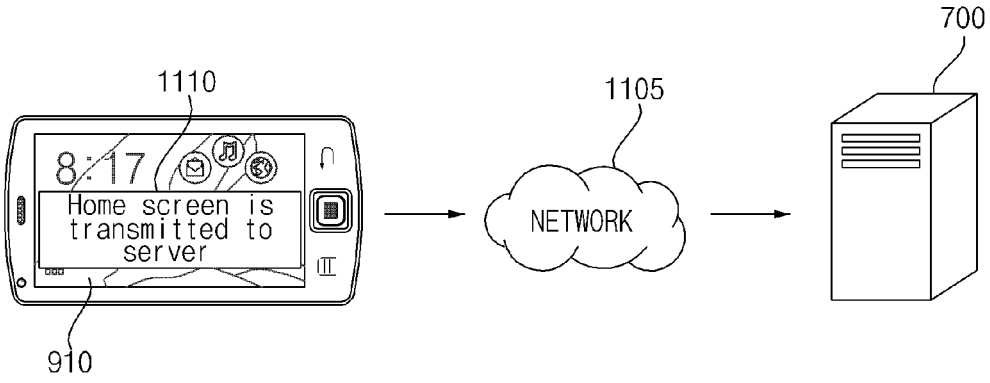


FIG. 11C

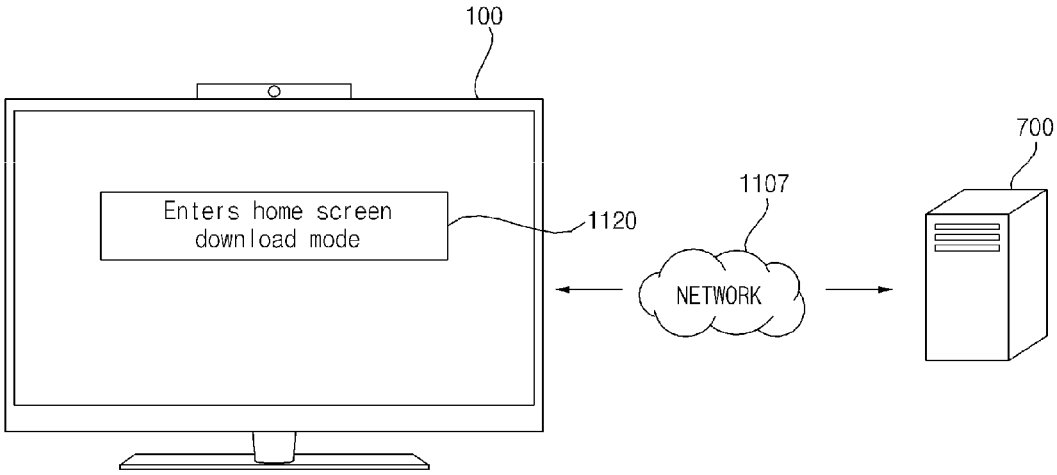


FIG. 11D

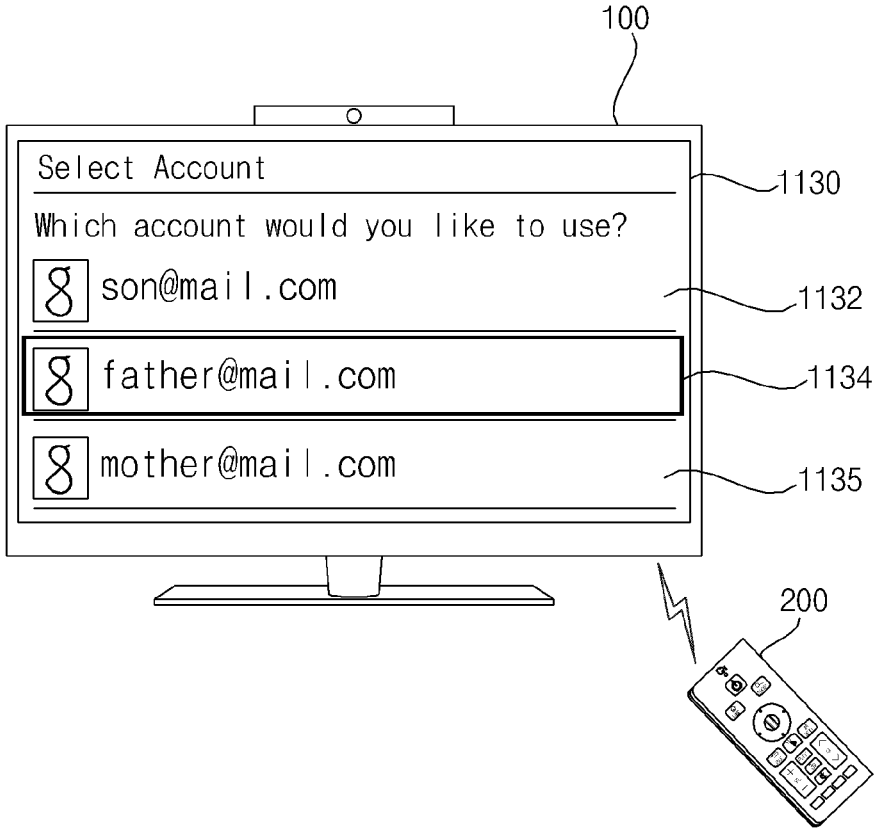

100
Select Account
Which account would you like to use?
son@mail.com
father@mail.com
mother@mail.com
1130
1132
1134
1135
200

FIG. 11E

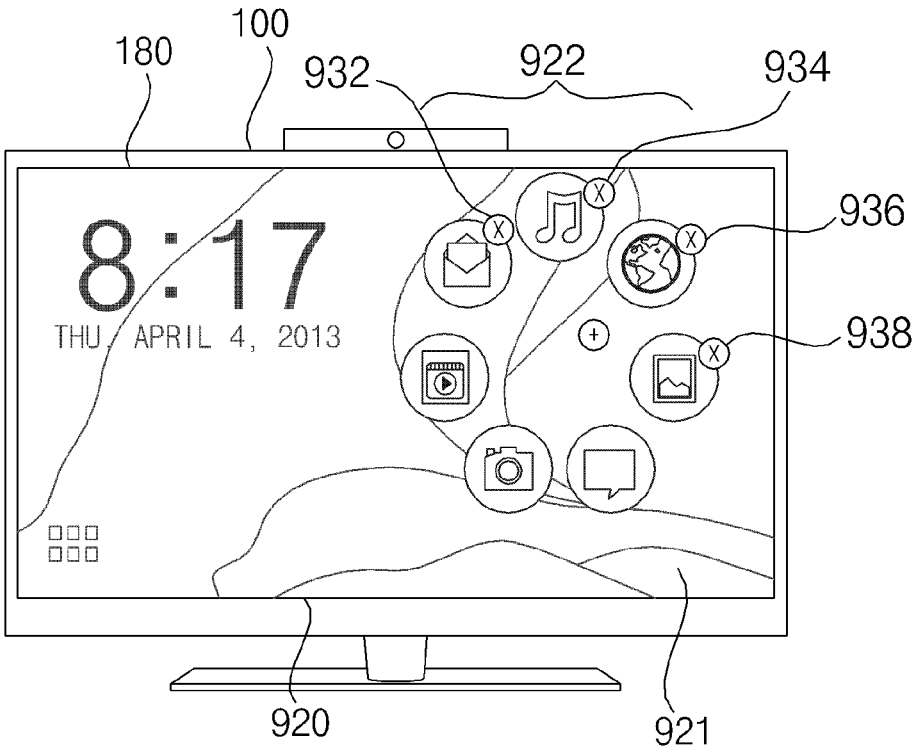


FIG. 12

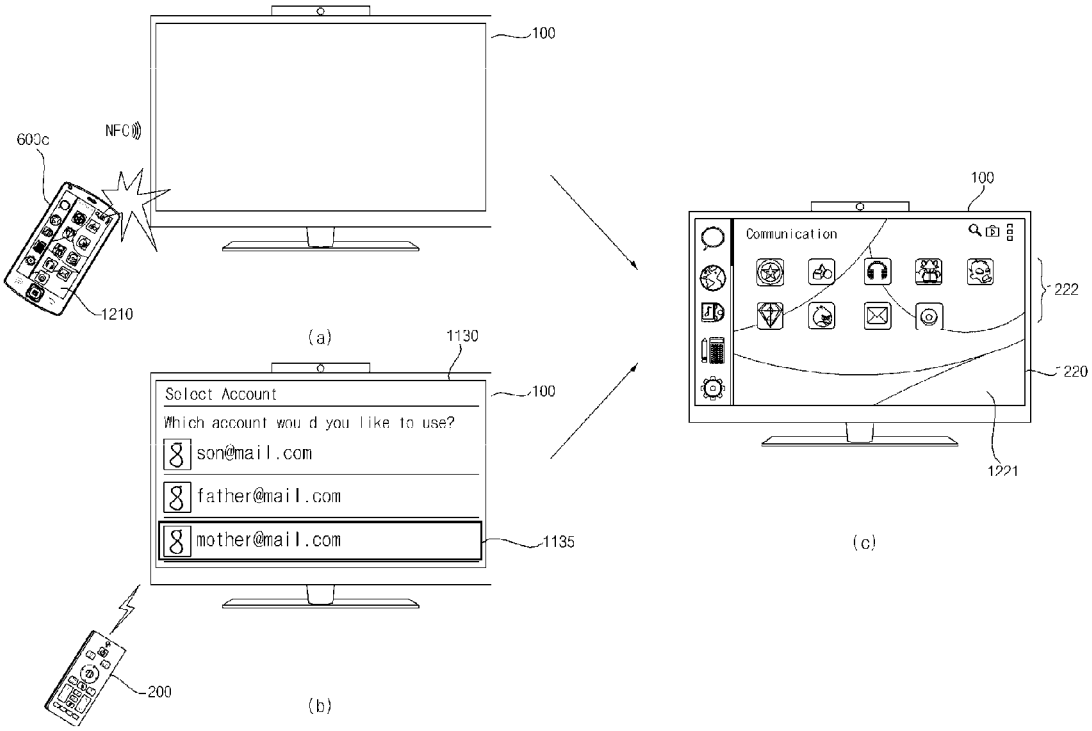

100
600c
NFC
1210
(a)
1130
100
Select Account
Which account wou d you like to use?
son@mail.com
father@mail.com
mother@mail.com
1135
200
(b)
100
Communication
222
220
1221
(c)

FIG. 13

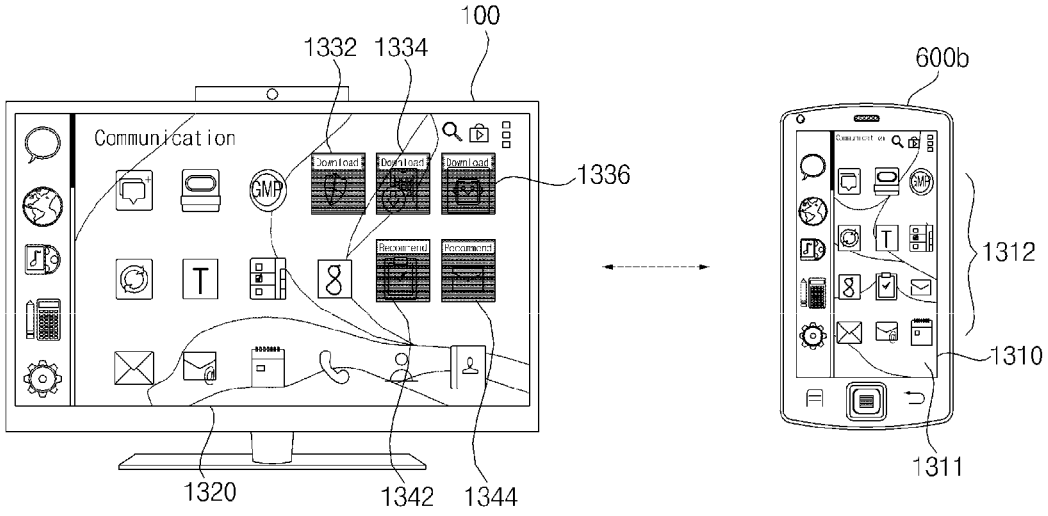

100
1332
1334
600b
Communication
Download
Download
Download
1336
GMP
Recommend
Recommend
1312
1310
1320
1342
1344
1311

FIG. 14

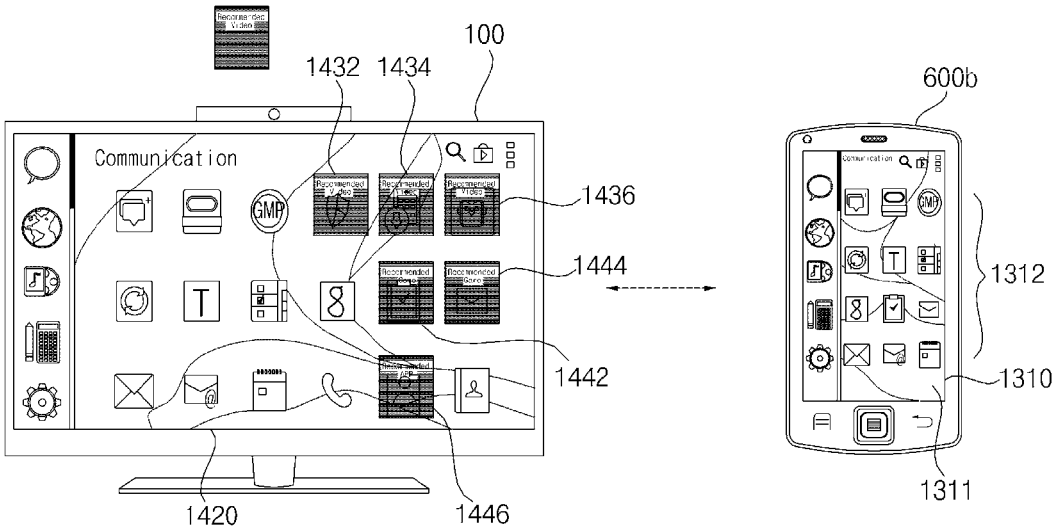
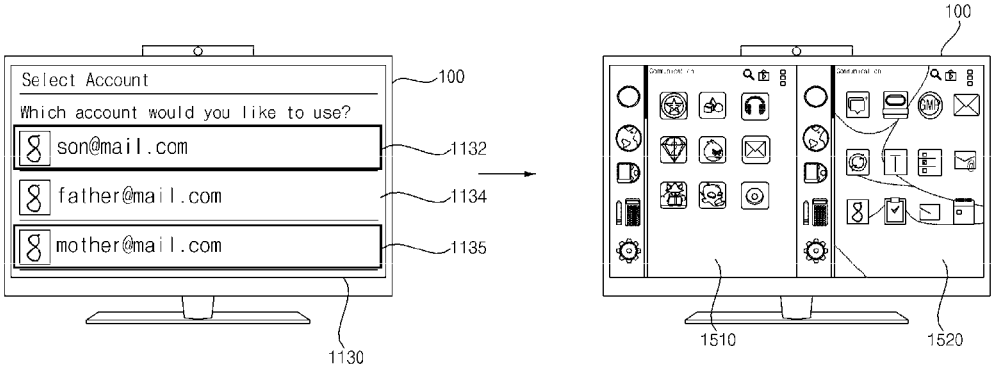
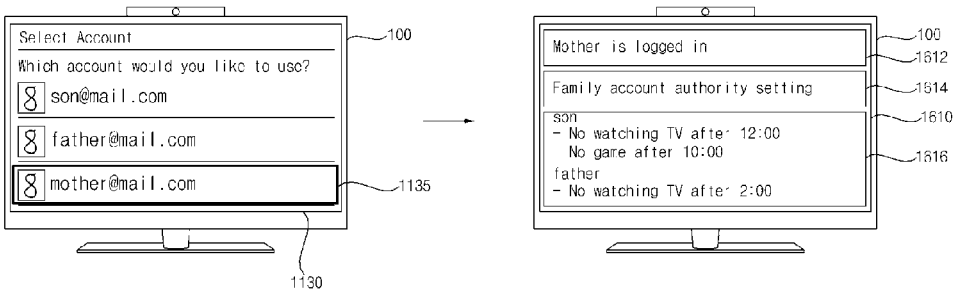


FIG. 15



(a) (b)

FIG. 16



(a) (b)

FIG. 17

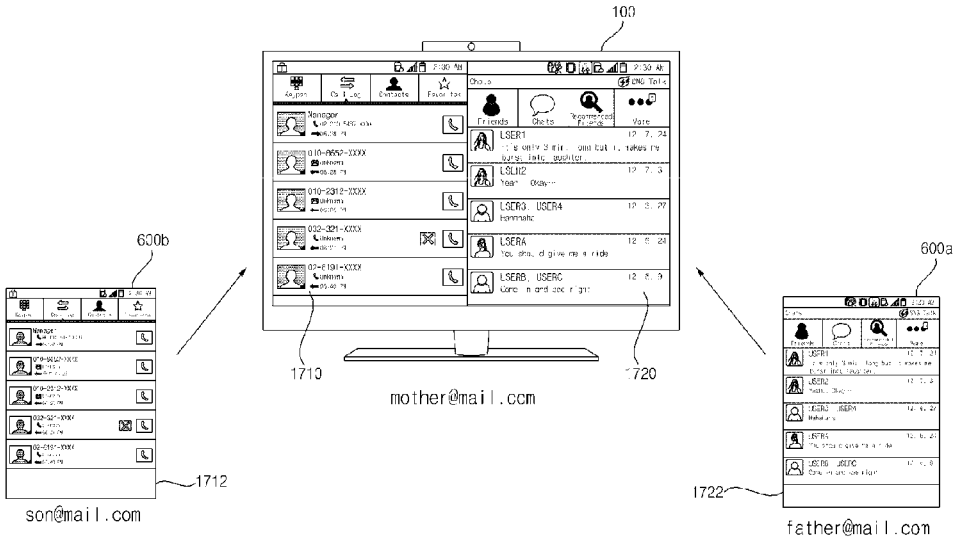


FIG. 18

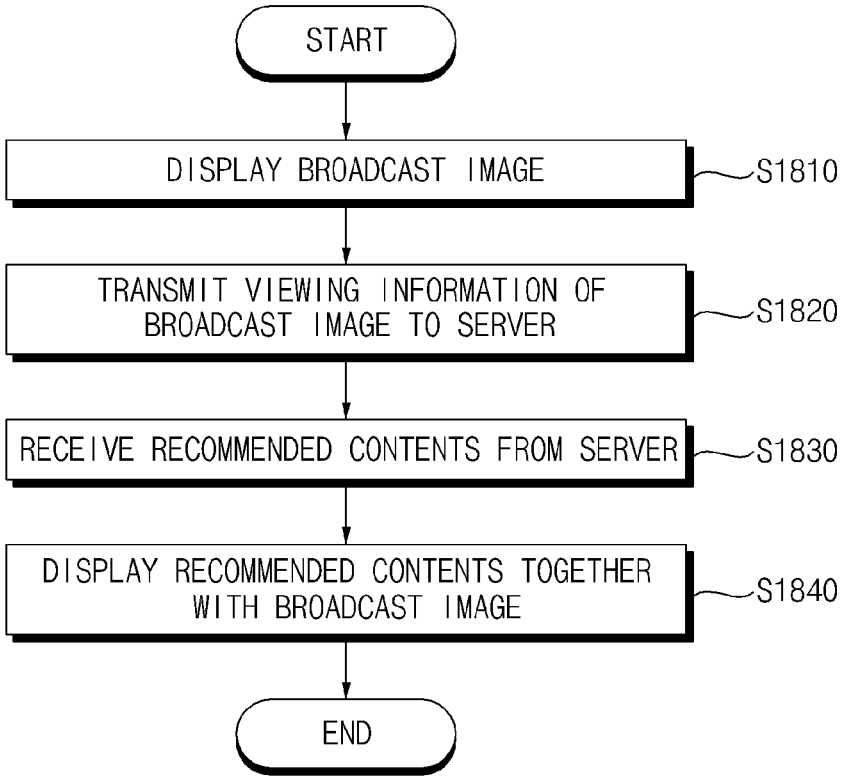

START
DISPLAY BROADCAST IMAGE
S1810
TRANSMIT VIEWING INFORMATION OF BROADCAST IMAGE TO SERVER
S1820
RECEIVE RECOMMENDED CONTENTS FROM SERVER
S1830
DISPLAY RECOMMENDED CONTENTS TOGETHER WITH BROADCAST IMAGE
S1840
END

FIG. 19A

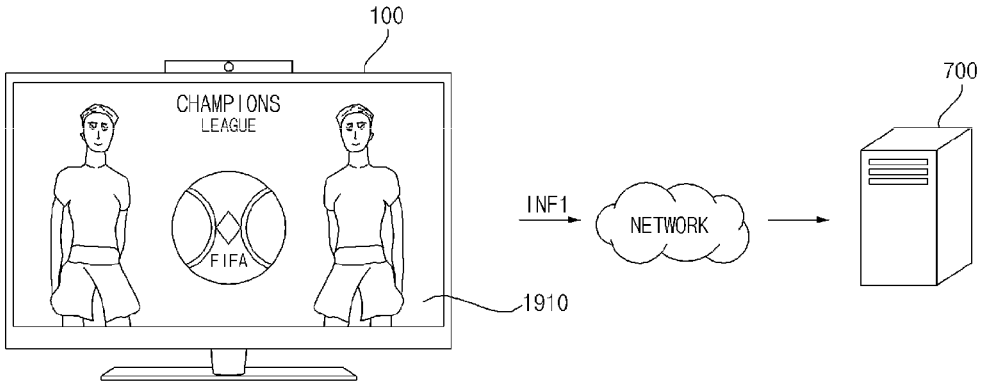


FIG. 19B

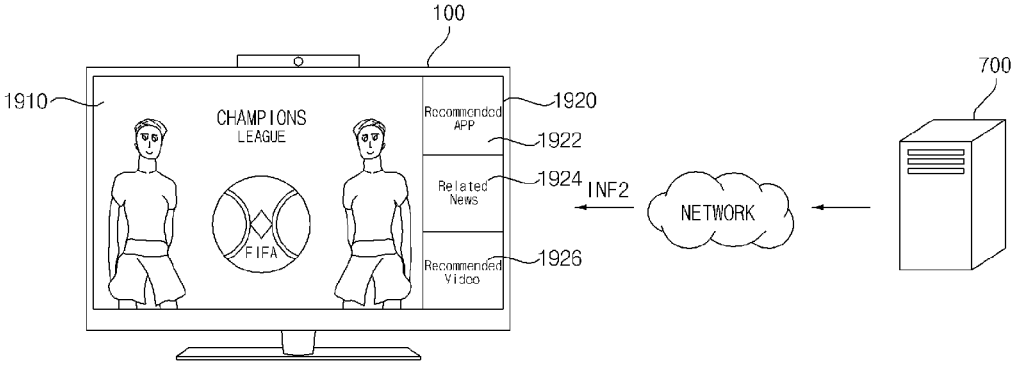


FIG. 19C

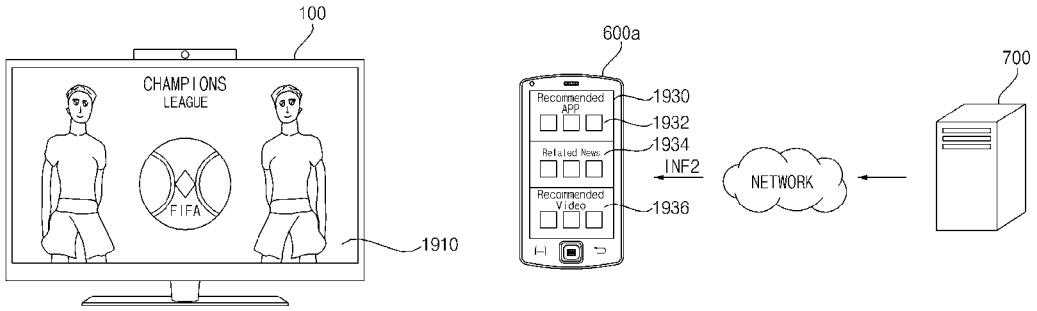


FIG. 20

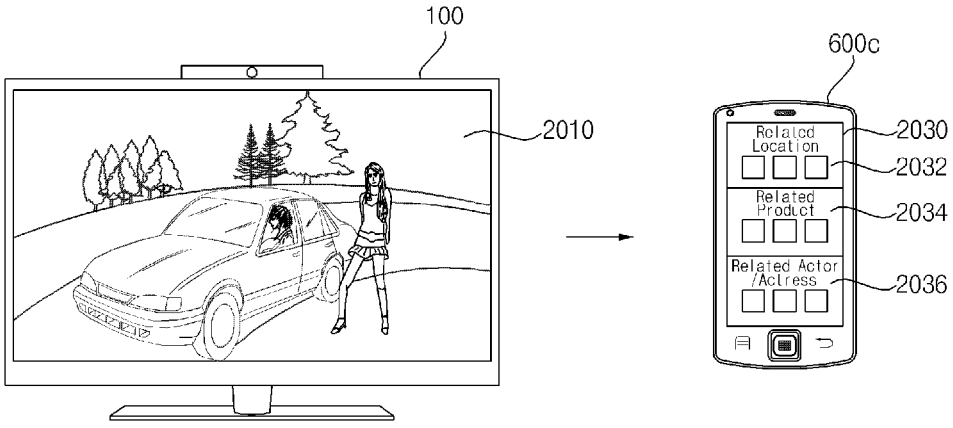


FIG. 21

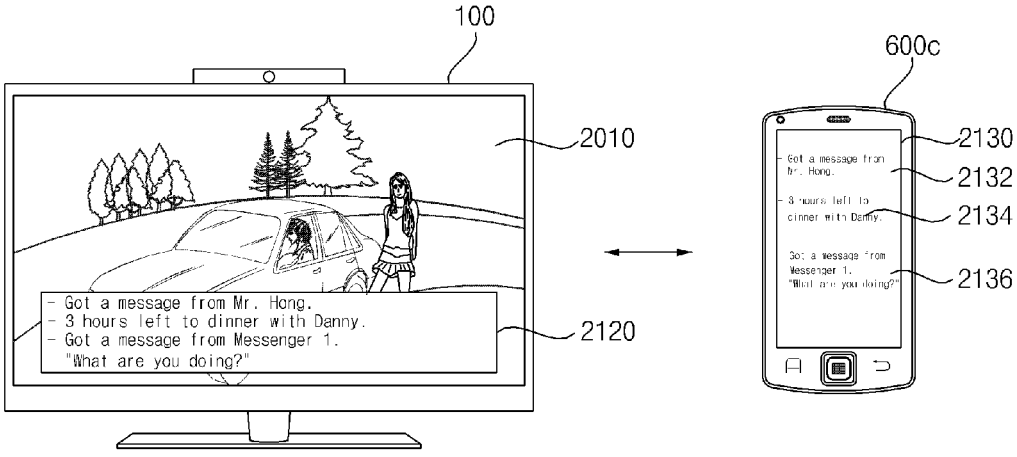

100
2010
2120
- Got a message from Mr. Hong.
- 3 hours left to dinner with Danny.
- Got a message from Messenger 1.
"What are you doing?"
600c
2130
2132
2134
2136

FIG. 22

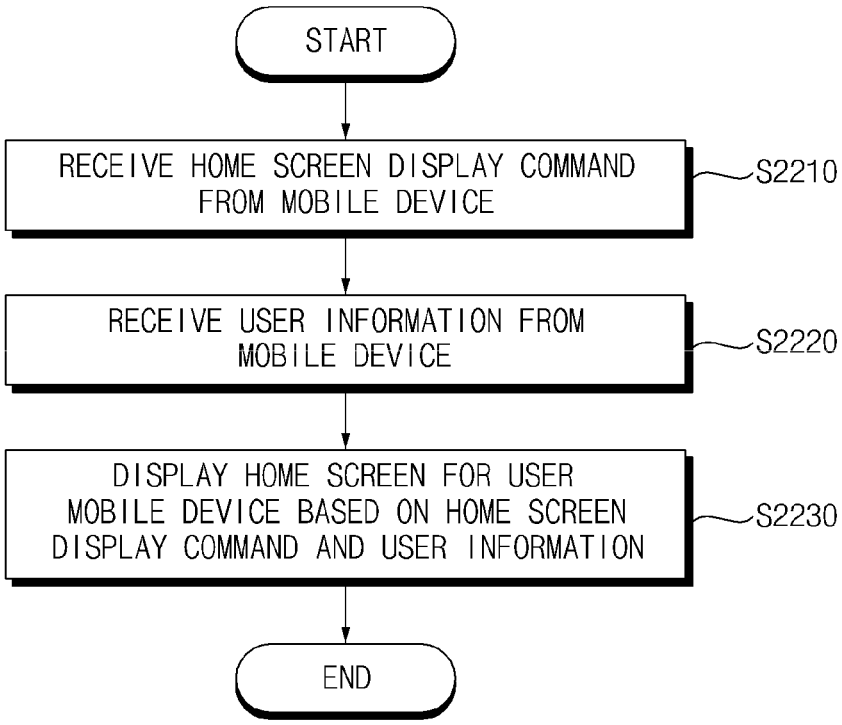

START
RECEIVE HOME SCREEN DISPLAY COMMAND FROM MOBILE DEVICE
S2210
RECEIVE USER INFORMATION FROM MOBILE DEVICE
S2220
DISPLAY HOME SCREEN FOR USER MOBILE DEVICE BASED ON HOME SCREEN DISPLAY COMMAND AND USER INFORMATION
S2230
END

FIG. 23A

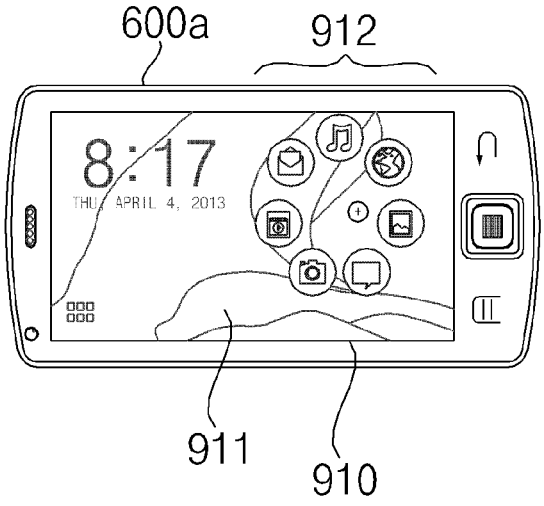


FIG. 23B

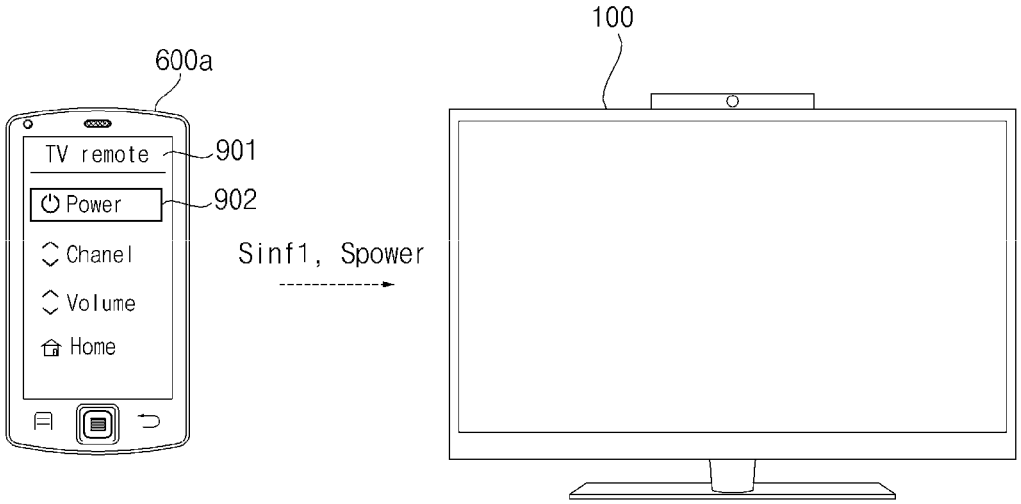

600a
TV remote
901
Power
902
Chanel
Volume
Home
Sinf1, Spower
100
(a)
(b)

FIG. 23C

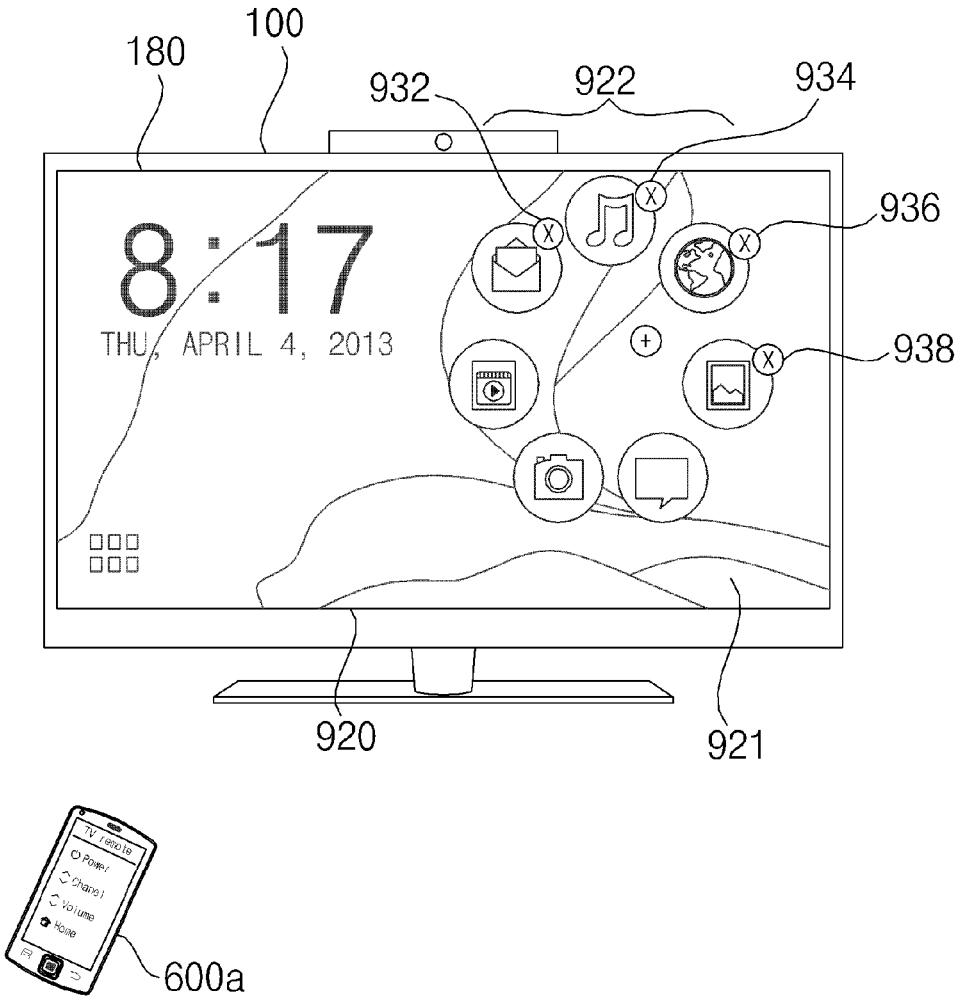


FIG. 24A

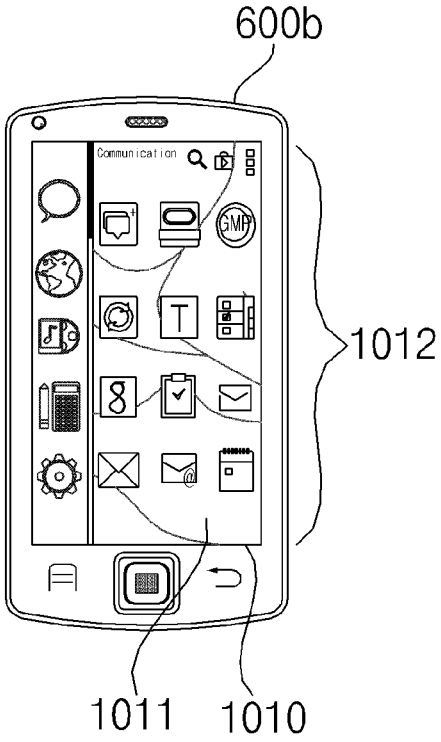


FIG. 24B

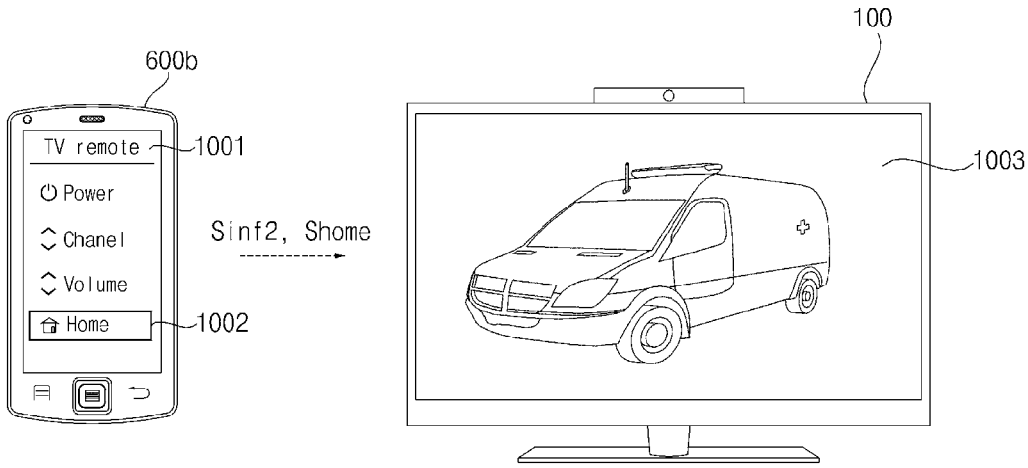

600b
TV remote
1001
Power
Chanel
Volume
Home
1002
Sinf2, Shome
100
1003
(a)
(b)

FIG. 24C

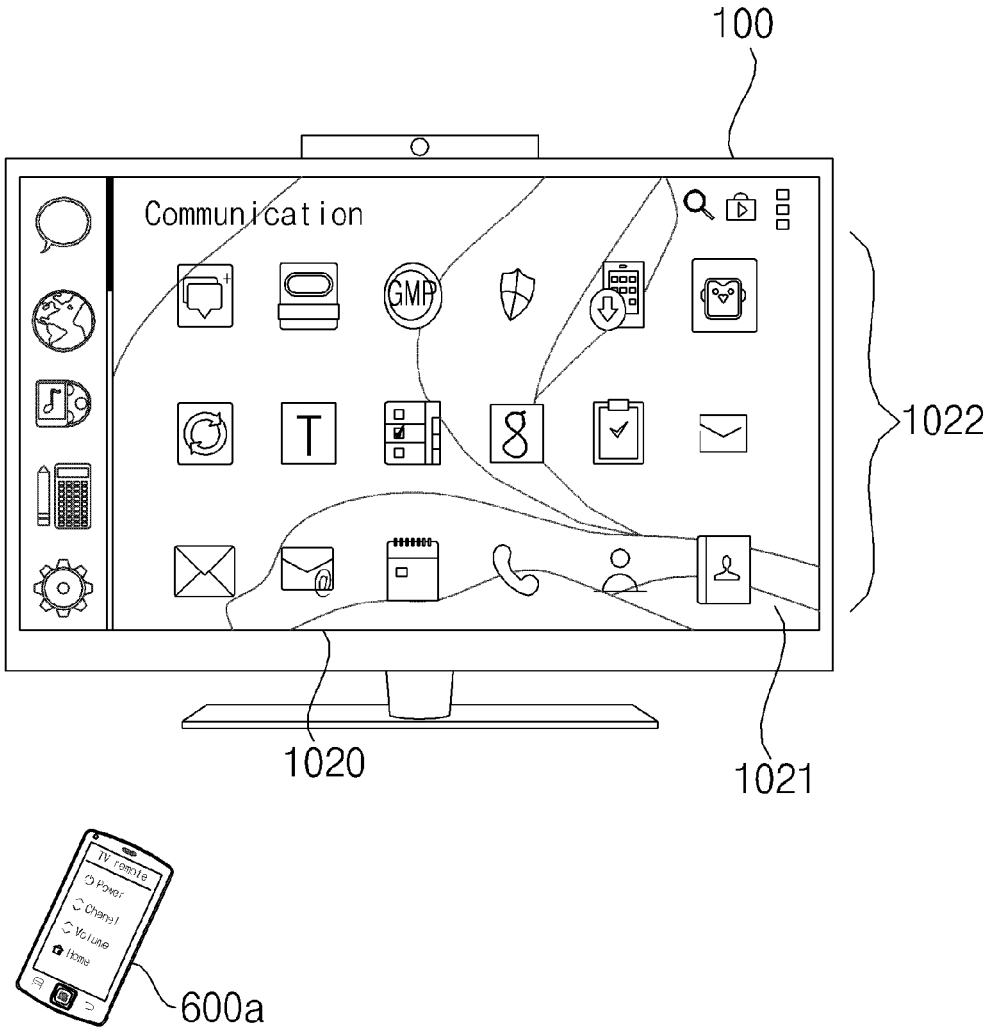

100
Communication
GMP
1022
1020
1021
TV Remote
Power
Channel
Volume
Home
600a

FIG. 25A

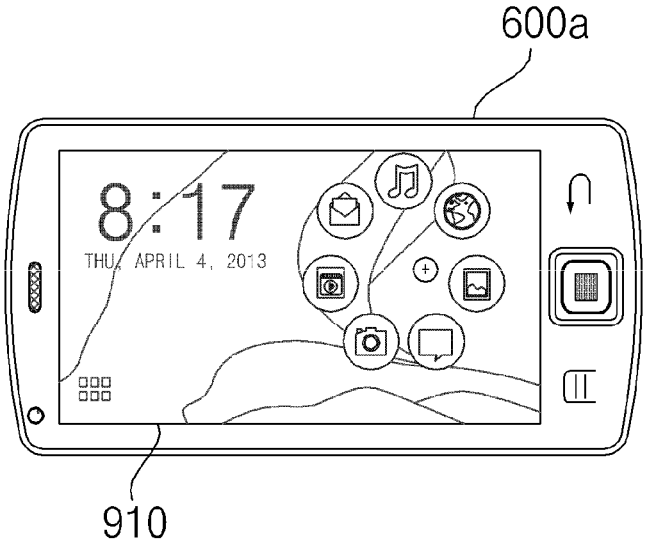


FIG. 25B

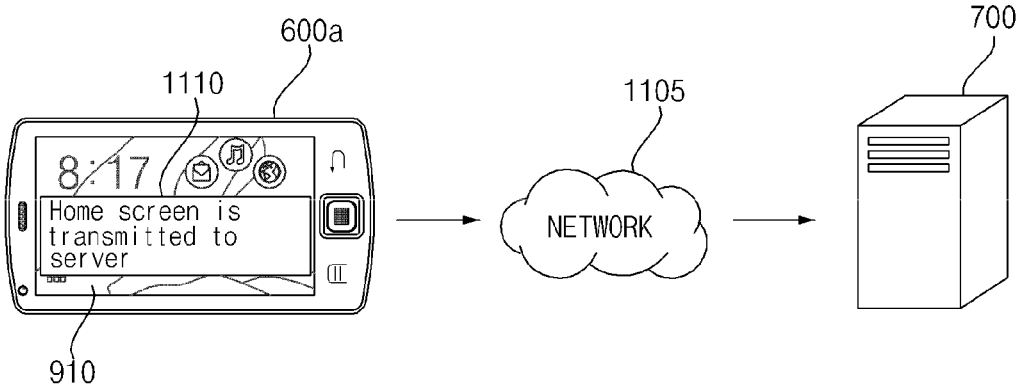


FIG. 25C

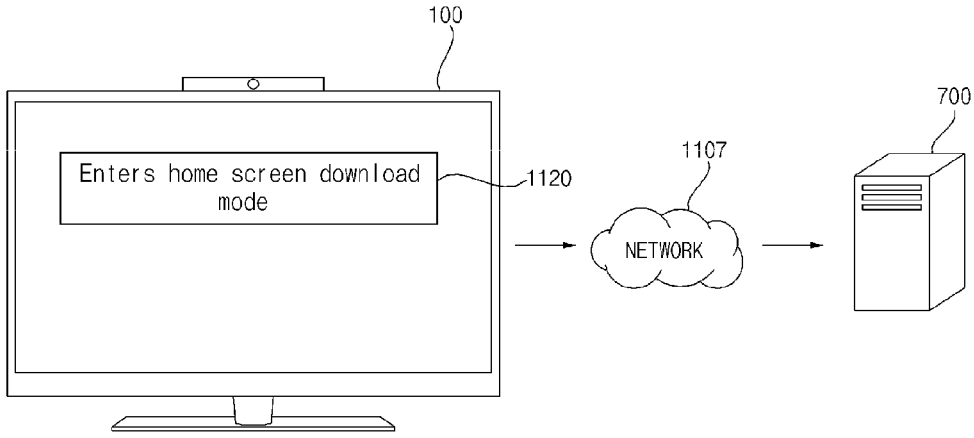


FIG. 25D

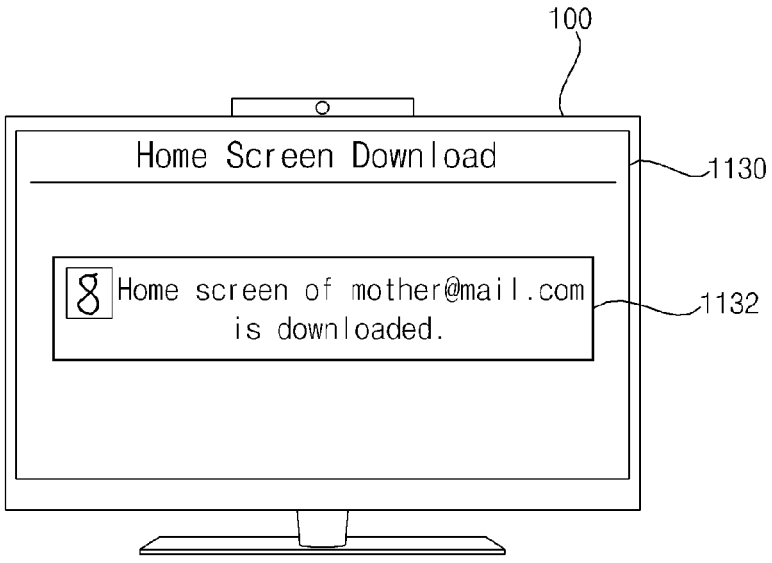


FIG. 25E

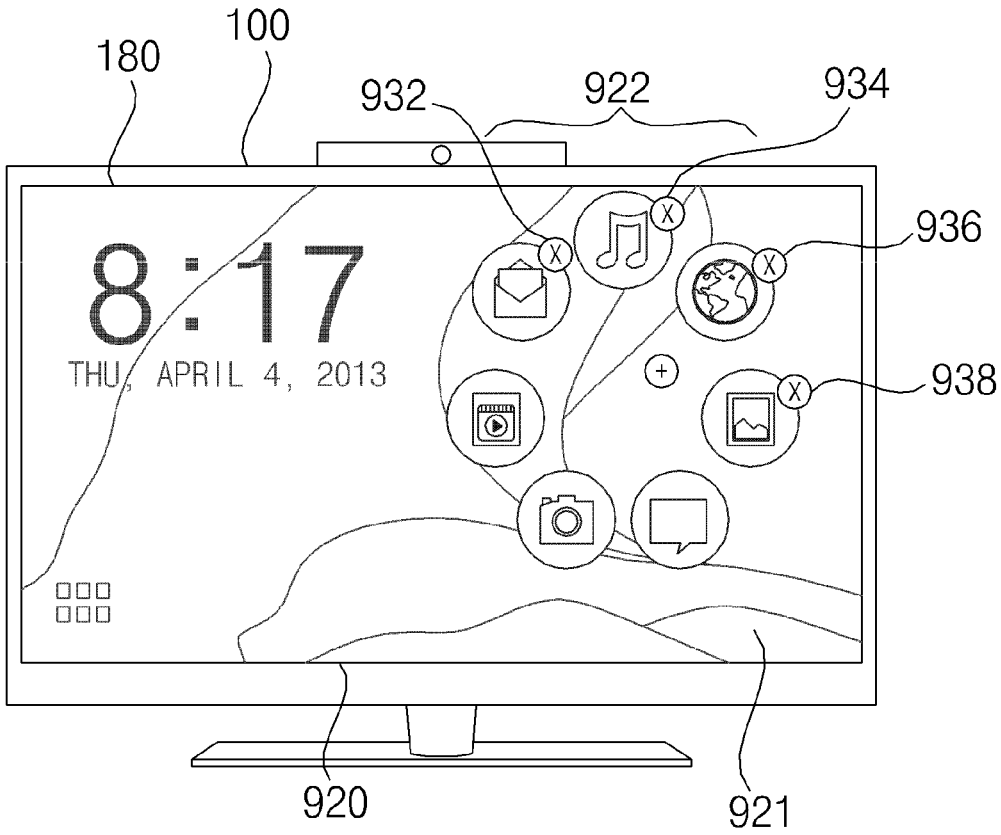


FIG. 26

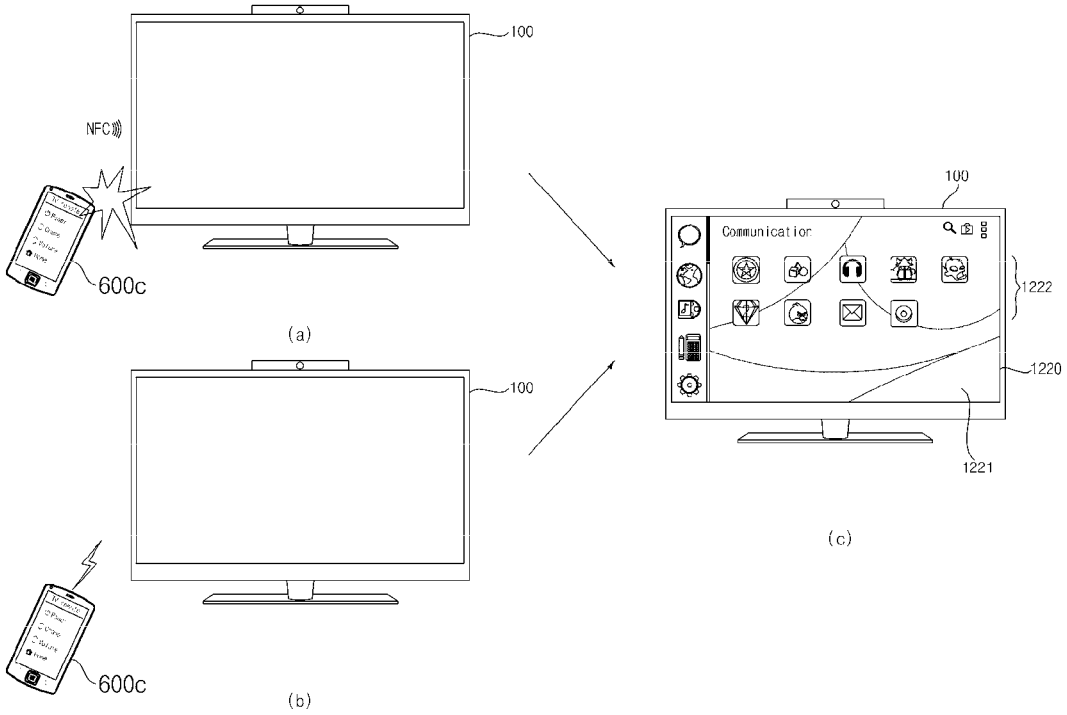


FIG. 27A

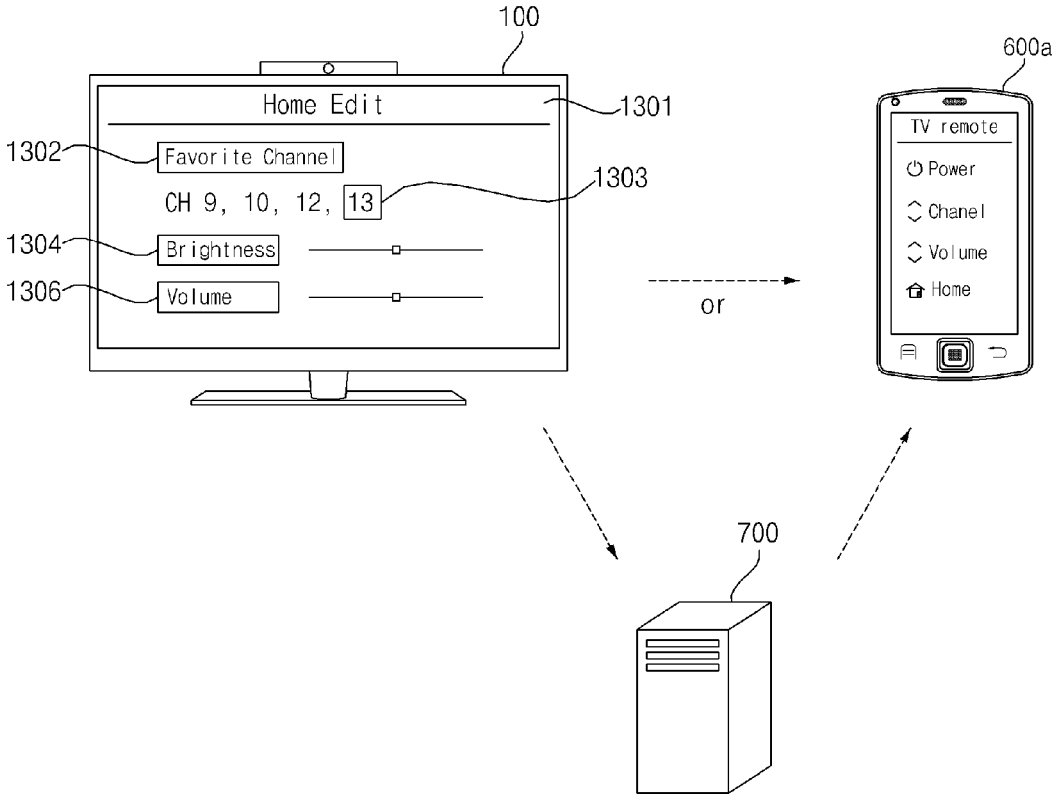

100
Home Edit
1301
1302
Favorite Channel
1303
CH 9, 10, 12, 13
1304
Brightness
1306
Volume
or
600a
TV remote
Power
Chanel
Volume
Home
700

FIG. 27B

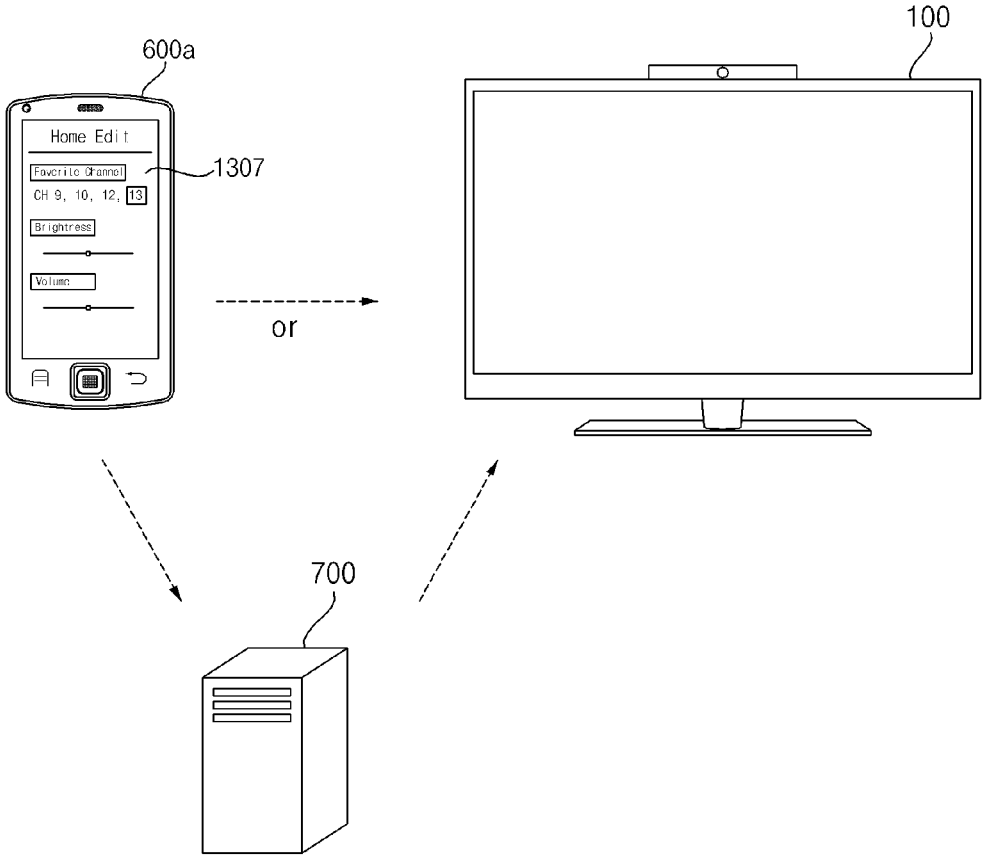
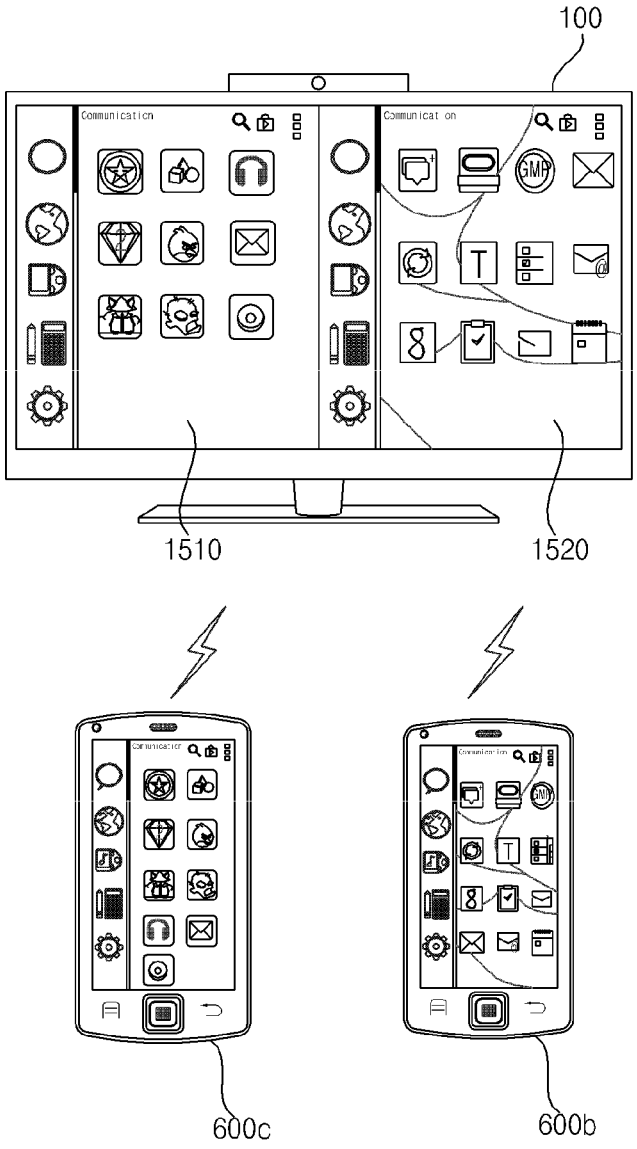

600a
Home Edit
Favorite Channel
CH 9, 10, 12, 13
Brightness
Volume
1307
or
100
700

FIG. 28



BROADCAST RECEIVING APPARATUS FOR RECEIVING A SHARED HOME SCREEN

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the priority benefit of Korean Patent Application Nos. 10-2013-0054803, filed on May 15, 2013 and 10-2013-0058701, filed on May 24, 2013 in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a broadcast receiving apparatus and a method for operating the same, and more particularly to a broadcast receiving apparatus capable of improving user convenience, and a method for operating the same.

2. Description of the Related Art

A broadcast receiving apparatus is an apparatus for receiving broadcast signals. A user may watch broadcast programs on the broadcast receiving apparatus. The broadcast receiving apparatus displays a broadcast program selected by the user on a display from among broadcast programs transmitted from broadcasting stations. The current trend in broadcasting around the world is shifted from analog broadcasting to digital broadcasting.

As it transmits digital audio/video (A/V) signals, digital broadcasting offers many advantages over analog broadcasting, for example, robustness against noise, less data loss, ease of error correction, and the ability to provide high-definition and clear images. In addition, unlike analog broadcasting, digital broadcasting allows interactive services.

SUMMARY OF THE INVENTION

Therefore, the present invention has been made in view of the above problems, and it is an object of the present invention to provide a broadcast receiving apparatus capable of improving user convenience, and a method for operating the same.

It is another object of the present invention to provide a broadcast receiving apparatus capable of receiving a shared home screen from another electronic device and displaying the received home screen, and a method for operating the same.

In accordance with an aspect of the present invention, the above and other objects can be accomplished by the provision of a broadcast receiving apparatus including an interface to access an electronic device that stores home screen information including a background image and a plurality of execution items, and to receive the home screen information from the electronic device, a controller to scale at least one of the background image and the execution items of the received home screen information, and a display to display a home screen including the scaled background image and execution items.

In accordance with another aspect of the present invention, there is provided a method for operating a broadcast receiving apparatus, the method including accessing an electronic device that stores home screen information including a background image and a plurality of execution items, receiving the home screen information from the electronic device, scaling at least one of the background image and the execution items of the received home screen information, and displaying a home screen including the scaled background image and execution items.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. **1**A is a diagram illustrating a broadcast receiving apparatus according to an embodiment of the present invention;

FIG. **1**B is a diagram illustrating a first surface of a remote controller of FIG. **1**A;

FIG. **1**C is a diagram illustrating a second surface of the remote controller of FIG. **1**A;

FIG. **2** is a block diagram of the broadcast receiving apparatus of FIG. **1**A;

FIG. **3** is a block diagram of the controller of FIG. **2**;

FIGS. **4** and **5** are diagrams illustrating exemplary smart platform architectures for the broadcast receiving apparatus of FIG. **2**;

FIG. **6**A is a diagram illustrating an operation method using the first surface of the remote controller of FIG. **1**B;

FIG. **6**B is a diagram illustrating an operation method using the second surface of the remote controller of FIG. **1**C;

FIG. **7** is a block diagram of the remote controller of FIG. **1**A;

FIG. **8** is a flowchart of a method for operating a broadcast receiving apparatus, according to an embodiment of the present invention;

FIGS. **9** to **17** are diagrams referred to for describing the method of FIG. **8**;

FIG. **18** is a flowchart of a method for operating a broadcast receiving apparatus, according to another embodiment of the present invention;

FIGS. **19**A to **21** are diagrams referred to for describing the method of FIG. **18**;

FIG. **22** is a flowchart of a method for operating a broadcast receiving apparatus, according to another embodiment of the present invention; and

FIGS. **23**A to **28** are diagrams referred to for describing the method of FIG. **22**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Exemplary embodiments of the present invention will be described with reference to the attached drawings.

The terms "module", "unit", and "--er" or "--or" used to signify components are used herein to help the understanding of the components and thus should not be construed as having specific meanings or functions. Accordingly, the terms "module", "unit", and "--er" or "--or" may be used interchangeably.

A broadcast receiving apparatus as set forth herein is an intelligent broadcast receiving apparatus equipped with a computer support function (e.g., Internet function) in addition to a broadcast reception function, and thus may have user-friendly interfaces such as a handwriting input device, a touch screen, or a three-dimensional (3D) pointing device. Furthermore, since wired or wireless Internet is supported, the broadcast receiving apparatus is capable of performing functions such as e-mailing, web browsing, banking, and gaming through connection to the Internet or a computer. For these various functions, a standard general-purpose operating system (OS) may be used.

That is, since various applications can be freely added to or deleted from a general-purpose OS kernel in the broadcast receiving apparatus according to the present invention, the

broadcast receiving apparatus may perform a number of user-friendly functions. For example, the broadcast receiving apparatus may be a smart TV.

FIG. **1**A is a diagram illustrating a broadcast receiving apparatus **100** according to an embodiment of the present invention.

Referring to FIG. **1**A, the broadcast receiving apparatus **100** is an apparatus for displaying images, and includes a display **180** (see FIG. **2**). The broadcast receiving apparatus **100** further includes a camera **195** for capturing an image of a user.

Although the camera **195** is disposed on the broadcast receiving apparatus **100**, the location of the camera **195** may be changed. Unlike FIG. **1**A, the broadcast receiving apparatus **100** and the camera **195** may be provided as separate devices.

The broadcast receiving apparatus **100** may exchange data with each external device via a network or through one-to-one communication.

The broadcast receiving apparatus **100** may exchange data with adjacent external devices, for example, home appliances **680**, a home server **650**, and a mobile device **600**. They may share certain content data. Here, the home appliances **680** may include a set-top box, sound equipment, a refrigerator, a vacuum cleaner, an air conditioner, a washing machine, cooking appliances, etc.

The broadcast receiving apparatus **100** may exchange data with external servers **700***a*, **700***b*, **700***c*, and . . . via a network **690**. The external servers **700***a*, **700***b*, **700***c*, and . . . may be content providers for providing various contents.

Unlike FIG. **1**A, the broadcast receiving apparatus **100** may exchange data with the mobile device **600** via the network **690**.

A broadcast receiving apparatus according to an embodiment of the present invention may receive home screen information including a background image and a plurality of execution items from another electronic device, and thus display a home screen corresponding to the home screen information. That is, the broadcast receiving apparatus may receive a shared home screen from another electronic device, scale and convert the received home screen to be suitable for the broadcast receiving apparatus, and display the converted home screen.

As such, a home screen used by a specific user may be shared among a plurality of electronic devices and thus user convenience may be improved.

Particularly, since a home screen of a mobile device may be used as a home screen of a broadcast receiving apparatus (e.g., TV), a user may use the broadcast receiving apparatus as if the user uses the mobile device.

The broadcast receiving apparatus **100** may operate in response to a remote control signal received from a remote controller **200**. To this end, the broadcast receiving apparatus **100** and the remote controller **200** may exchange data through, for example, paring.

Particularly, by exchanging data, the broadcast receiving apparatus **100** may display a pointer corresponding to motion of the remote controller **200**, or display text input using character keys of the remote controller **200**.

The broadcast receiving apparatus **100** according to the present invention may include a TV receiver, a monitor, a projector, a notebook computer, a digital broadcast receiver, etc.

The mobile device **600** according to the present invention may include portable devices, for example, a smart phone, a music player, a tablet, an e-book, a tab book, etc.

According to an embodiment of the present invention, the broadcast receiving apparatus **100** is an apparatus for displaying images, and may be a mobile broadcast receiving apparatus as well as a fixed broadcast receiving apparatus.

FIG. **1**B is a diagram illustrating a first surface **201** of the remote controller **200** of FIG. **1**A, and FIG. **1**C is a diagram illustrating a second surface **251** of the remote controller **200** of FIG. **1**A.

Referring to FIG. **1**B, operation keys such as a power key **202** may be disposed on the first surface **201** (front surface) of the remote controller **200**.

A description is now given of various operation keys. The power key **202** is used to power on or off the broadcast receiving apparatus **100**. A home key **204** is used to display a home screen of the broadcast receiving apparatus **100** if the home screen is set. A search key **206** may be used to display a search bar on the broadcast receiving apparatus **100**, or to perform a search function when a search word is input.

A four-direction key **210** is used to move a pointer or cursor horizontally and vertically, and may be integrally formed with an up key **210***c*, a down key **210***d*, a left key **210***b*, and a right key **210***a*. A wheel key **220** may be disposed at the center of the four-direction key **210**.

The wheel key **220** is used to move a screen or items displayed on the broadcast receiving apparatus **100**. The wheel key **220** may operate upward or downward and thus the screen or items displayed on the broadcast receiving apparatus **100** may move upward or downward.

A back key **222** is used to move to a previous screen or item displayed on the broadcast receiving apparatus **100**. A menu key **224** is used to display a menu set for the broadcast receiving apparatus **100**. A pointer key **225** is used to display a pointer on the broadcast receiving apparatus **100**.

A volume key **230** is used for volume control, and a channel key **240** is used for channel selection.

A 3D key **235** may be used to convert a two-dimensional (2D) image displayed on the broadcast receiving apparatus **100**, into a 3D image, or to display a list of 3D images displayable on the broadcast receiving apparatus **100**.

A PIP key **241** is a key for displaying a plurality of images on the broadcast receiving apparatus **100**. Due to operation of the PIP key **241**, a plurality of images may be displayed on the display **180** in the form of picture in picture (PIP). Alternatively, a plurality of images may be displayed in parallel.

Any one of the plurality of images may be floated to have a variable location. In this case, the PIP images may also be referred to as dynamic screen images.

In addition, a pointer key for displaying a pointer, a guide key for displaying a guide, a mute key, a color key, etc. are further illustrated in FIG. **1**B.

Referring to FIG. **1**C, the second surface **251** (rear surface) of the remote controller **200** may be an opposite surface to the first surface **201** (front surface) of the remote controller **200**. Character keys **260** and a display **270** may be disposed on the second surface **251** (rear surface) of the remote controller **200**.

The character keys **260** may include number keys **262** and alphabet keys **264**. In addition, the character keys **260** may further include various keys such as an enter key, function keys, and a spacebar key.

The display **270** may display text input using the character keys **260**.

When the character keys **260** are input, the remote controller **200** transmits text information input using the character keys **260**, to the broadcast receiving apparatus **100**.

Alternatively, the remote controller **200** may transmit coordinate information corresponding to motion of the remote

controller **200**, to the broadcast receiving apparatus **100**. As such, a pointer corresponding to the motion of the remote controller **200** may be displayed on the display **180** of the broadcast receiving apparatus **100**. Since the pointer moves according to the motion of the remote controller **200** in a 3D space as described above, the remote controller **200** may be referred to as a 3D pointing device.

FIG. **2** is a block diagram of the broadcast receiving apparatus **100** of FIG. **1**A.

Referring to FIG. **2**, the broadcast receiving apparatus **100** includes a broadcast receiver **105**, a network interface **130**, an external device interface **135**, a memory **140**, a user input interface **150**, a controller **170**, a display **180**, an audio output unit **185**, a power supply **190**, and a camera **195**. The broadcast receiver **105** may include a tuner **110** and a demodulator **120**. The broadcast receiver **105** may further include a network interface **130**.

The tuner **110** selects a radio frequency (RF) broadcast signal corresponding to a user-selected channel or a pre-stored channel among RF broadcast signals received via an antenna. Furthermore, the tuner **110** converts the selected RF broadcast signal into an intermediate frequency (IF) signal or a baseband audio/video (A/V) signal.

For example, if the selected RF broadcast signal is a digital broadcast signal, the tuner **110** converts the selected RF broadcast signal into a digital IF signal DIF. Otherwise, if the selected RF broadcast signal is an analog broadcast signal, the tuner **110** converts the selected RF broadcast signal into an analog baseband A/V signal CVBS/SIF.

The tuner **110** may sequentially select RF broadcast signals corresponding to all broadcast channels stored using a channel memory function, among the RF broadcast signals received via the antenna, and convert the selected RF broadcast signals into IF signals or baseband A/V signals.

The demodulator **120** receives the digital IF signal DIF converted by the tuner **110**, and demodulates the digital IF signal DIF.

The demodulator **120** may perform demodulation and channel decoding and then output a stream signal TS. In this case, the stream signal TS may be a signal in which video, audio, and data signals are multiplexed.

The stream signal TS output from the demodulator **120** may be input to the controller **170**. The controller **170** may perform demultiplexing, A/V signal processing, etc. and output video and audio signals respectively to the display **180** and the audio output unit **185**.

The external device interface **135** may connect an external device and the broadcast receiving apparatus **100**. To this end, the external device interface **135** may include an A/V input/output (I/O) unit (not shown).

The external device interface **135** may be connected to an external device such as a digital versatile disk (DVD) player, a Blu-ray player, a game console, a camera, a camcorder, a computer (e.g., a laptop computer), a set-top box, etc. wirelessly or by wire. The external device interface **135** may transmit signals to or receive signals from the external device.

In order to allow input of A/V signals from the external device to the broadcast receiving apparatus **100**, the A/V I/O unit of the external device interface **135** may include a universal serial bus (USB) port, a composite video banking sync (CUBS) port, a component port, an S-video port (analog), a digital visual interface (DVI) port, a high definition multimedia interface (HDMI) port, a Red, Green, Blue (RGB) port, a D-subminiature (D-SUB) port, etc.

In addition, the external device interface **135** may be connected to various set-top boxes via at least one of the above-described ports to transmit signals to or receive signals from the set-top boxes.

The network interface **130** serves as an interface for connecting the broadcast receiving apparatus **100** and a wired/wireless network such as the Internet. For example, the network interface **130** may receive content or data from the Internet, a content provider, or a network operator over a network.

The network interface **130** may be connected to a certain web page over a connected network or another network linked to the connected network. That is, the network interface **130** may be connected to a certain web page over a network and transmit data to or receive data from a corresponding server. In addition, the network interface **130** may receive content or data from a content provider or a network operator.

Furthermore, the network interface **130** may selectively receive a desired application among applications open to the public via a network.

The network interface **130** may include a wired communication unit (not shown) and a radio communication unit (not shown).

The radio communication unit of the network interface **130** may perform short-range wireless communication with other electronic devices. The broadcast receiving apparatus **100** may be connected to another electronic device over a network according to communication standards such as Bluetooth, Radio Frequency Identification (RFID), Infrared Data Association (IrDA), Ultra WideBand (UWB), ZigBee, Digital Living Network Alliance (DLNA), Near Field Communication (NFC), etc.

The memory **140** may store programs necessary for the controller **170** to process and control signals, and also store processed video, audio, and data signals.

The memory **140** may temporarily store video, audio, and data signals input through the external device interface **135** or the network interface **130**. Furthermore, the memory **140** may store information about certain broadcast channels using a channel memory function.

In addition, the memory **140** may store an application or an application list input through the external device interface **135** or the network interface **130**.

The broadcast receiving apparatus **100** may reproduce and provide a content file (e.g. a video file, a still image file, a music file, a document file, an application file, etc.) to a user.

Although the memory **140** is separated from the controller **170** in FIG. **2**, the present invention is not limited thereto and the memory **140** may be included in the controller **170**.

The user input interface **150** transmits a signal input by the user, to the controller **170**, or transmits a signal received from the controller **170**, to the user.

For example, the user input interface **150** may receive a user input signal such as a power on/off signal, a channel selection signal, or a screen setting signal from the remote controller **200**, transmit a user input signal input using a local key (not shown) such as a power key, a channel key, a volume key, or a setting key to the controller **170**, transmit a user input signal input using a sensor unit (not shown) for sensing a user gesture, to the controller **170**, or transmit a signal received from the controller **170**, to the sensor unit.

The controller **170** may demultiplex the stream signal TS input from the tuner **110**, the demodulator **120**, or the external device interface **135**, and generates and output A/V signals by processing the demultiplexed signals.

The video signal processed by the controller **170** may be input to the display **180** and displayed as an image corre-

sponding to the video signal. The video signal processed by the controller **170** may also be transmitted to an external output device through the external device interface **135**.

The audio signal processed by the controller **170** may be output to the audio output unit **185**. The audio signal processed by the controller **170** may also be transmitted to the external output device through the external device interface **135**.

Although not shown in FIG. **2**, the controller **170** may include a demultiplexer and a video processor. Descriptions thereof will be provided below with reference to FIG. **3**.

In addition, the controller **170** may provide overall control to the broadcast receiving apparatus **100**. For example, the controller **170** may control the tuner **110** to select (tune to) an RF broadcast signal corresponding to a user-selected channel or a pre-stored channel.

The controller **170** may control the broadcast receiving apparatus **100** according to a user command input through the user input interface **150** or according to an internal program. Particularly, the controller **170** may be connected to a network and download a user-desired application or application list into the broadcast receiving apparatus **100**.

For example, the controller **170** controls the tuner **110** to receive a signal of a channel selected according to a certain channel selection command received through the user input interface **150**. Then, the controller **170** processes a video, audio, or data signal of the selected channel. The controller **170** outputs information about the user-selected channel together with the processed A/V signal to the display **180** or the audio output unit **185**.

As another example, the controller **170** outputs a video or audio signal received through the external device interface **135** from an external device, for example, a camera or a camcorder, to the display **180** or the audio output unit **185**, according to an external device image play command received through the user input interface **150**.

The controller **170** may control the display **180** to display an image. In this case, the image displayed on the display **180** may be a 2D or 3D still image or video.

The controller **170** may control a certain 2D object in the image displayed on the display **180**, to be rendered as a 3D object. For example, the object may be at least one of a connected web page (e.g. a newspaper, a magazine, etc.), an electronic program guide (EPG), a menu, a widget, an icon, a still image, a video, and text.

The controller **170** may recognize the location of the user based on an image captured by an image capturing unit (not shown). For example, the controller **170** may measure the distance (a z-axis coordinate) between the user and the broadcast receiving apparatus **100**. In addition, the controller **170** may calculate x-axis and y-axis coordinates corresponding to the location of the user on the display **180**.

When an application view item is selected, the controller **170** may control display of an application or application list which is available in the broadcast receiving apparatus **100** or can be downloaded from an external network.

The controller **170** may control installation and execution of applications downloaded from the external network, in conjunction with various user interfaces. The controller **170** may also control display of an image related to an executed application, on the display **180** according to selection of the user.

The controller **170** may receive a user image captured by the camera **195**. Then, the controller **170** may recognize a user based on the captured user image, and control the recognized user to log in the broadcast receiving apparatus **100**. The controller **170** may provide service according to the logged-in user.

Alternatively, the controller **170** may recognize a gesture of the user based on the user image captured by the camera **195**. Particularly, the controller **170** may recognize a face and hand(s) of the user based on the captured user image, and determine whether the face and hand(s) make a specific gesture.

The display **180** generates a drive signal by converting a processed video signal, a processed data signal, and an on screen display (OSD) signal received from the controller **170**, or a video signal and a data signal received through the external device interface **135**, into an RGB signal.

The display **180** may be a plasma display panel (PDP), a liquid crystal display (LCD), an organic light-emitting diode (OLED), or a flexible display. The display **180** may also be a 3D display.

The display **180** may be formed as a touch screen and thus used as not only an output device but also an input device.

The audio output unit **185** receives a processed audio signal from the controller **170** and outputs the received audio signal as sound.

The power supply **190** supplies power to the broadcast receiving apparatus **100**. Particularly, the power supply **190** may supply power to the controller **170** which can be implemented as a system on chip (SOC), the display **180** for displaying an image, and the audio output unit **185** for outputting sound.

To this end, the power supply **190** may include a converter (not shown) for converting alternating current (AC) power into direct current (DC) power. For example, if the display **180** is formed as a liquid crystal panel having a plurality of backlight lamps, the power supply **190** may further include an inverter (not shown) capable of performing pulse width modulation (PWM) for luminance change or dimming driving.

The camera **195** may capture an image of the user and transmit the captured image to the controller **170** of the broadcast receiving apparatus **100**. Although one camera **195** is illustrated in FIG. **1**A, a plurality of cameras may be used. The camera **195** may be a 2D camera or a 3D camera.

The remote controller **200** transmits user input to the user input interface **150**. To this end, the remote controller **200** may use communication standards such as RF, IR, Bluetooth, UWB, ZigBee, etc.

In addition, the remote controller **200** may receive a video, audio, or data signal from the user input interface **150** and output the received signal as an image, sound, or vibration.

The block diagram of the broadcast receiving apparatus **100** illustrated in FIG. **2** is an embodiment of the present invention. Depending upon the specifications of the broadcast receiving apparatus **100** in actual implementation, the broadcast receiving apparatus **100** may include fewer components or more components than those illustrated in FIG. **2**. That is, two or more components of the broadcast receiving apparatus **100** may be combined into a single component or a single component thereof may be separated into two or more components. The functions of the components are provided only to describe embodiments of the present invention and do not limit the scope of the invention.

The broadcast receiving apparatus **100** may receive a broadcast image through the network interface **130** or the external device interface **135** and reproduce the broadcast image, without using the tuner **110** and the demodulator **120** illustrated in FIG. **2**.

FIG. **3** is a block diagram of the controller **170** of FIG. **2**.

Referring to FIG. **3**, the controller **170** may include a demultiplexer **310**, a video processor **320**, a processor **330**, an OSD generator **340**, a mixer **350**, a frame rate converter (FRC) **355**, and a formatter **360**. The controller **170** may further include an audio processor (not shown) and a data processor (not shown).

The demultiplexer **310** demultiplexes an input stream. For example, the demultiplexer **310** may demultiplex an MPEG-2 TS into video, audio, and data signals. Here, the stream signal input to the demultiplexer **310** may be received from the tuner **110**, the demodulator **120**, or the external device interface **135**.

The video processor **320** may process the demultiplexed video signal. To this end, the video processor **320** may include a video decoder **325** and a scaler **335**.

The video decoder **325** decodes the demultiplexed video signal, and the scaler **335** scales the resolution of the decoded video signal in such a manner that the video signal is displayable on the display **180**.

The video decoder **325** may operate based on various standards.

The video signal decoded by the video processor **320** is input to the mixer **350**.

The processor **330** may provide overall control to the broadcast receiving apparatus **100** or the controller **170**. For example, the processor **330** may control the tuner **110** to tune to an RF broadcast signal corresponding to a user-selected channel or a pre-stored channel.

The processor **330** may control the broadcast receiving apparatus **100** according to a user command received through the user input interface **150** or according to an internal program.

The processor **330** may control data transmission through the network interface **130** or the external device interface **135**.

The processor **330** may control operations of the demultiplexer **310**, the video processor **320**, and the OSD generator **340** of the controller **170**.

The OSD generator **340** generates an OSD signal autonomously or according to user input. For example, the OSD generator **340** may generate a signal for displaying various types of information as graphic or text on a screen of the display **180**, according to a user input signal or a control signal. The generated OSD signal may include various types of data, for example, a user interface screen, menu screens, widgets, icons, etc.

For example, the OSD generator **340** may generate a signal for displaying captions of a broadcast image, or broadcast information based on an EPG.

Since the OSD generator **340** generates an OSD signal or a graphic signal, the OSD generator **340** may be referred to as a graphic processor.

The mixer **350** may mix the OSD signal generated by the OSD generator **340** with the decoded video signal processed by the video processor **220**. The mixed signal is provided to the formatter **360**. Since a decoded broadcast image signal or an external input signal is mixed with an OSD signal, the OSD may be overlapped with the broadcast image or the external input image.

The FRC **355** may change the frame rate of an input image. Alternatively, the FRC **355** may not change but constantly maintain the frame rate of the input image.

The formatter **360** changes the format of the signal output from the FRC **355** to be suitable for the display **180**. For example, the formatter **360** may convert a received signal into an RGB data signal. The RGB data signal may be output as a low voltage differential signal (LVDS) or a mini-LVDS.

The formatter **360** may change the format of a 3D video signal or convert a 2D image into a 3D image.

The audio processor (not shown) of the controller **170** may process the demultiplexed audio signal. To this end, the audio processor may include a variety of decoders.

The audio processor of the controller **170** may control the bass, treble or volume of the audio signal.

The data processor (not shown) of the controller **170** may process the demultiplexed data signal. For example, if the demultiplexed data signal is a coded data signal, the data processor may decode the data signal. The coded data signal may be EPG information including broadcast information indicating the start time, end time, etc. of broadcast programs of each channel.

The block diagram of the controller **170** illustrated in FIG. **3** is an embodiment of the present invention. Depending upon the specifications of the controller **170** in actual implementation, the controller **170** may include fewer components or more components than those illustrated in FIG. **3**.

Particularly, the FRC **355** and the formatter **360** may be separated from the controller **170**.

FIGS. **4** and **5** are diagrams illustrating various examples of the platform architecture for the broadcast receiving apparatus **100** of FIG. **2**.

A platform for the broadcast receiving apparatus **100** may have OS-based software to implement the above-described various operations.

Referring to FIG. **4**, a platform for the broadcast receiving apparatus **100** according to an embodiment of the present invention may be a separate type and designed to separate a legacy system platform **400** and a smart system platform **405**. An OS kernel **410** may be used commonly by the legacy system platform **400** and the smart system platform **405**.

The legacy system platform **400** may include a driver **420**, middleware **430**, and an application layer **450** on the OS kernel **410**, and the smart system platform **405** may include a library **435**, a framework **440**, and an application layer **455** on the OS kernel **410**.

The OS kernel **410** is the core of an OS. When the broadcast receiving apparatus **100** is driven, the OS kernel **410** may perform at least one of driving of hardware drivers, security protection for hardware and processors in the broadcast receiving apparatus **100**, efficient management of system resources, memory management, hardware interfacing by hardware abstraction, multi-processing, and scheduling associated with the multi-processing. The OS kernel **410** may further perform power management, etc.

The hardware drivers of the OS kernel **410** may include, for example, at least one of a display driver, a Wireless Fidelity (Wi-Fi) driver, a Bluetooth driver, a USB driver, an audio driver, a power manager, a binder driver, and a memory driver.

Furthermore, the hardware drivers of the OS kernel **410** may be drivers for hardware devices in the OS kernel **410**, and include a character device driver, a block device driver, and a network device driver. The block device driver may need a buffer for buffering as much data as a unit size because data is transmitted in block units. The character device driver may not need a buffer because data is transmitted in basic data units, that is, in character units.

The OS kernel **410** may be implemented based on various OSs such as Unix (Linux), Windows, etc. The OS kernel **410** may be a general-purpose open OS kernel which is usable in other electronic devices.

The driver **420** is located between the OS kernel **410** and the middleware **430**, and drives devices in conjunction with the middleware **430** for operation of the application layer **450**. For example, the driver **420** may include drivers for a micro-

computer (micom), a display module, a graphic processing unit (GPU), a frame rate converter (FRC), a general-purpose input/output (GPIO) pin, a high-definition multimedia interface (HDMI), a system decoder (or demultiplexer) (SDEC), a video decoder (VDEC), an audio decoder (ADEC), a personal video recorder (PVR), an inter-integrated circuit (I2C), etc. These drivers operate in conjunction with the hardware drivers of the OS kernel **410**.

In addition, the driver **420** may further include a driver for the remote controller **200** and, more particularly, a 3D pointing device to be described below. The 3D pointing device driver may be included in the OS kernel **410** or the middleware **430**, instead of the driver **420**.

The middleware **430** may be located between the OS kernel **410** and the application layer **450**, and mediate data transmission and reception between different hardware devices or different software programs. As such, the middleware **430** may provide standard interfaces, support various environments, and enable interaction between tasks with different systems.

Examples of the middleware **430** of the legacy system platform **400** may include Multimedia and Hypermedia information coding Experts Group (MHEG) and Advanced Common Application Platform (ACAP) middleware related to data broadcasting, Program and System Information Protocol (PSIP) or System Information (SI) middleware related to broadcast information, Digital Living Network Alliance (DLNA) middleware related to peripheral device communication, etc.

The application layer **450** on the middleware **430** in the legacy system platform **400** may include, for example, user interface (UI) applications related to various menus of the broadcast receiving apparatus **100**. The application layer **450** on the middleware **430** may be edited according to user selection over a network. Using the application layer **450**, a user may enter a desired menu among various UIs by manipulating the remote controller **210** while viewing a broadcast image.

The application layer **450** of the legacy system platform **400** may further include at least one of a TV guide application, a Bluetooth application, a reservation application, a digital video recorder (DVR) application, and a hotkey application.

In the smart system platform **405**, the library **435** may be located between the OS kernel **410** and the framework **440**, and form the basis of the framework **440**. For example, the library **435** may include secure socket layer (SSL) as a library related to security, WebKit as a library related to web engines, c library (libc), media framework as a library related to media, for example, a video format and an audio format, etc. The library **435** may be written in C or C++. Also, the library **435** may be exposed to a developer through the framework **440**.

The library **435** may include a runtime **437** having a core Java library and a virtual machine (VM). The runtime **437** forms the basis of the framework **440** in conjunction with the library **435**.

The VM may be a virtual machine for allowing concurrent execution of a plurality of instances, that is, multi-tasking. For each application of the application layer **455**, a VM may be allocated and executed. In this case, for scheduling or interconnection between the instances, a binder driver (not shown) of the OS kernel **410** may operate.

The binder driver and the runtime **437** may connect Java-based applications and C-based libraries.

The library **435** and the runtime **437** may correspond to the middleware **430** of the legacy system platform **400**.

The framework **440** of the smart system platform **405** includes programs on which applications of the application layer **455** are based. The framework **440** is compatible with any application and may allow reuse, movement, or exchange of components. The framework **440** may include supporting programs, programs for interconnecting different software components, etc. For example, the framework **440** may include a resource manager, an activity manager related to activities of the applications, a notification manager, a content provider for abstracting shared information among the applications, etc. The framework **440** may be written in Java.

The application layer **455** on the framework **440** includes a variety of programs which are executable in and displayable on the broadcast receiving apparatus **100**. For example, the application layer **455** may include a core application having at least one of e-mail, short message service (SMS), calendar, map, and browser. The application layer **455** may be written in Java.

The applications of the application layer **455** may be categorized into user-undeletable applications **465** stored in the broadcast receiving apparatus **100**, and user-installable or user-deletable applications **475** downloaded from an external device or a network and stored in the broadcast receiving apparatus **100**.

Using the applications of the application layer **455**, Internet phone service, video on demand (VOD) service, web album service, social networking service (SNS), location-based service (LBS), map service, web browsing service, application search service, etc. may be performed through network access. In addition, various functions such as gaming and scheduling may be performed by the applications.

Referring to FIG. **5**, a platform for the broadcast receiving apparatus **100** according to another embodiment of the present invention may be an integrated type and include an OS kernel **510**, a driver **520**, middleware **530**, a framework **540**, and an application layer **550**.

The integrated-type platform of FIG. **5** is different from the separate-type platform of FIG. **4** in that the library **435** is not provided and the application layer **550** is formed as an integrated layer. The driver **520** and the framework **540** correspond to the driver **420** and the framework **440** of FIG. **4**, respectively.

The library **435** of FIG. **4** may be integrated into the middleware **530**. That is, the middleware **530** may include both legacy system middleware and broadcast receiver system middleware. As described before, the legacy system middleware may include MHEG or ACAP middleware related to data broadcasting, PSIP or SI middleware related to broadcast information, DLNA middleware related to peripheral device communication, etc., and the broadcast receiver system middleware may include SSL as a library related to security, WebKit as a library related to web engines, libc, media framework as a library related to media, etc. The middleware **530** may further include the above-described runtime.

The application layer **550** may include a menu-related application, a TV guide application, a reservation application, etc. as legacy system applications, and e-mail, SMS, calendar, map, browser, etc. as broadcast receiver system applications.

The applications of the application layer **550** may be categorized into user-undeletable applications **565** stored in the broadcast receiving apparatus **100**, and user-installable or user-deletable applications **575** downloaded from an external device or a network and stored in the broadcast receiving apparatus **100**.

The above-described platforms of FIGS. **4** and **5** may be used for general purposes in various electronic devices as well as the broadcast receiving apparatus **100**.

The platforms of FIGS. **4** and **5** may be loaded in the memory **140**, the controller **170**, or a separate processor (not shown).

FIG. **6**A is a diagram illustrating an operation method using the first surface **201** of the remote controller **200** of FIG. **1**B.

Referring to FIG. **6**A, while the first surface **201** of the remote controller **200** faces upward, a pointer **205** is displayed to correspond to motion of the remote controller **200**.

FIG. **6**A(a) illustrates that the pointer **205** corresponding to the remote controller **200** is displayed at a certain location of the display **180**.

A user may move the remote controller **200** horizontally and vertically (FIG. **6**A(b)), and back and forth (FIG. **6**A(c)), or rotate the remote controller **200**. The pointer **205** displayed on the display **180** of the broadcast receiving apparatus **100** moves to correspond to motion of the remote controller **200**. Since the pointer **205** moves according to the motion of the remote controller **200** in a 3D space as illustrated in FIG. **6**A, the remote controller **200** may be referred to as a space remote controller or a 3D pointing device.

FIG. **6**A(b) illustrates that, when the user moves the remote controller **200** leftward, the pointer **205** displayed on the display **180** of the broadcast receiving apparatus **100** correspondingly moves leftward.

Information about motion of the remote controller **200** sensed by a sensor of the remote controller **200** is transmitted to the broadcast receiving apparatus **100**. The broadcast receiving apparatus **100** may calculate a coordinate of the pointer **205** based on the information about motion of the remote controller **200**. The broadcast receiving apparatus **100** may display the pointer **205** to correspond to the calculated coordinate.

FIG. **6**A(c) illustrates that, while a certain button of the remote controller **200** is being pressed, a user moves the remote controller **200** away from the display **180**. As such, a selected area of the display **180** corresponding to the pointer **205** may be zoomed in and enlarged. On the contrary, when the user moves the remote controller **200** toward the display **180**, the selected area of the display **180** corresponding to the pointer **205** may be zoomed out and reduced in size. Otherwise, when the remote controller **200** moves away from the display **180**, the selected area may be zoomed out and, when the remote controller **200** moves toward the display **180**, the selected area may be zoomed in.

Alternatively, while the certain button of the remote controller **200** is being pressed, horizontal or vertical motion of the remote controller **200** may be ignored. That is, when the remote controller **200** moves away from or toward the display **180**, only back and forth motion of the remote controller **200** may be sensed and horizontal or vertical motion of the remote controller **200** may be ignored. When the certain button of the remote controller **200** is not pressed, only the pointer **205** moves according to horizontal or vertical motion of the remote controller **200**.

The speed and direction of the pointer **205** may correspond to the speed and direction of the remote controller **200**.

FIG. **6**B is a diagram illustrating an operation method using the second surface **251** of the remote controller **200** of FIG. **1**C;

Referring to FIG. **6**B, the second surface **251** of the remote controller **200** faces upward, the first surface **201** faces downward, and character keys of the remote controller **200** are input.

For example, if a first alphabet key **281**, a second alphabet key **282**, and a third alphabet key **282** among the character keys are sequentially input, the remote controller **200** transmits corresponding key information to the broadcast receiving apparatus **100**. As such, the broadcast receiving apparatus **100** may display corresponding text "abc" **715** on a display window **710**.

The characters "abc" may be correspondingly displayed on the display **270** of the remote controller **200**.

FIG. **7** is a block diagram of the remote controller **200** of FIG. **1**A.

Referring to FIG. **7**, the remote controller **200** may include a radio communication unit **820**, a user input unit **830**, a sensor unit **840**, an output unit **850**, a power supply **860**, a memory **870**, and a controller **880**.

The radio communication unit **820** transmits and receives signals to and from any one of the broadcast receiving apparatuses according to the embodiments of the present invention. Among the broadcast receiving apparatuses according to the embodiments of the present invention, for example, one broadcast receiving apparatus **100** will be described.

In the current embodiment, the radio communication unit **820** may include an RF module **821** for transmitting and receiving signals to and from the broadcast receiving apparatus **100** according to the RF communication standard. The radio communication unit **820** may further include an IR module **823** for transmitting and receiving signals to and from the broadcast receiving apparatus **100** according to the IR communication standard.

In the current embodiment, the remote controller **200** may transmit information about motion of the remote controller **200** to the broadcast receiving apparatus **100** through the RF module **821**.

The remote controller **200** may receive a signal from the broadcast receiving apparatus **100** through the RF module **821**. The remote controller **200** may transmit a command related to power on/off, channel selection, volume control, etc. to the broadcast receiving apparatus **100** through the IR module **823**.

In the current embodiment, the user input unit **830** may include an operation key input unit **832** for inputting operation keys, and a character key input unit **834** for inputting character keys.

The operation key input unit **832** may include various operation keys placed on the front surface **201** of the remote controller **200** as described above in relation to FIG. **1**B. For example, the operation key input unit **832** may include the power key **202**, the home key **204**, the search key **206**, the four-direction key **210**, the wheel key **222**, the back key **222**, the menu key **224**, the volume key **230**, the 3D key **235**, the channel key **240**, etc.

The character key input unit **834** may include various character keys placed on the rear surface **251** of the remote controller **200** as described above in relation to FIG. **1**B. For example, the character key input unit **834** may include the number keys **262**, the alphabet keys **264**, etc.

A user may input a command for remotely controlling the broadcast receiving apparatus **100** by manipulating the user input unit **830**. If the user input unit **230** includes hard keys, the user may input a command related to the broadcast receiving apparatus **100** using the remote controller **200** by pushing the hard keys. If the user input unit **230** includes a touchscreen, the user may input a command related to the broadcast receiving apparatus **100** using the remote controller **200** by touching soft keys on the touchscreen. In addition, the user input unit **830** may include a variety of input means to be manipulated by the user, for example, a scroll key, a jog key, etc., and the current embodiment does not limit the scope of the present invention.

The sensor unit **840** may sense and output motion information of the remote controller **200**. To this end, the sensor unit **840** may include a gyro sensor **841** or an acceleration sensor **843**.

The gyro sensor **841** may sense information about the direction of the remote controller **200**. For example, the gyro sensor **841** may sense information about the direction of the remote controller **200** on x, y, and z axes.

The acceleration sensor **843** may sense information about the speed of the remote controller **200**. For example, the acceleration sensor **843** may sense information about the speed of the remote controller **200** on x, y, and z axes.

The sensor unit **840** may further include a distance measuring sensor for sensing distance information from the display **180**.

The motion information output from the sensor unit **840** may include the information about the direction of the remote controller **200**, which is sensed by the gyro sensor **841**, and the information about the speed of the remote controller **200**, which is sensed by the acceleration sensor **843**, and further include the distance information.

The output unit **850** may output an A/V signal corresponding to manipulation of the user input unit **830** or a signal transmitted from the broadcast receiving apparatus **100**. The user may recognize whether the user input unit **830** is manipulated or whether the broadcast receiving apparatus **100** is controlled, based on the A/V signal output from the output unit **850**.

For example, the output unit **850** may include a light emitting diode (LED) module **851** for producing light when the user input unit **830** is manipulated or a signal is transmitted to or received from the broadcast receiving apparatus **100** through the radio communication unit **820**, a vibration module **853** for generating vibrations, an audio output module **855** for outputting sound, or a display module **857** for displaying an image.

The power supply **860** supplies power to the remote controller **200**. If the remote controller **200** does not move for a certain period of time, the power supply **860** may cut off supply of power to the remote controller **200** to save power. The power supply **860** may resume supply of power when a certain key of the remote controller **200** is manipulated.

The memory **870** may store various programs and application data for controlling or operating the remote controller **200**. The remote controller **200** may wirelessly transmit and receive signals to and from the broadcast receiving apparatus **100** in a certain frequency band through the RF module **821**. The controller **880** of the remote controller **200** may store information about the frequency band used to wirelessly transmit and receive signals between the remote controller **200** and the broadcast receiving apparatus **100** paired to the remote controller **200**, in the memory **870** and then refer to this information later.

The controller **880** provides overall control to the remote controller **200**.

The controller **880** may transmit key manipulation information of the user input unit **830** or motion information of the remote controller **200** sensed by the sensor unit **840**, to the broadcast receiving apparatus **100** through the radio communication unit **820**.

The broadcast receiving apparatus **100**, more particularly, the user input interface **150** receives the key manipulation information or the motion information. To this end, the user input interface **150** may include a radio communication unit **811**.

The radio communication unit **811** may include an RF module **812** for RF communication with the remote controller **200**, and an IR module **813** for IR communication with the remote controller **200**.

The user input interface **150** may further include a coordinate calculator **815** for calculating a coordinate of a pointer using the motion information of the remote controller **200**.

The coordinate of the pointer may be calculated by the controller **170** instead of the coordinate calculator **815**. To this end, the user input interface **150** may transfer the motion information of the remote controller **200** to the controller **170**.

FIG. **8** is a flowchart of a method for operating the broadcast receiving apparatus **100**, according to an embodiment of the present invention, and FIGS. **9** to **17** are diagrams referred to for describing the method of FIG. **8**.

Referring to FIG. **8**, the broadcast receiving apparatus **100** accesses an electronic device that stores home screen information (S**810**).

The broadcast receiving apparatus **100** may be connected to the electronic device due to input of an electronic device connection command. Here, the electronic device may be an adjacent mobile device.

For example, FIG. **12**(*a*) illustrates that a mobile device **600***c* approaches the broadcast receiving apparatus **100** within a certain distance to perform tagging. As such, the broadcast receiving apparatus **100** may be connected to the mobile device **600***c* through NFC using the network interface **130**.

As another example, as illustrated in FIG. **11**C, the broadcast receiving apparatus **100** may be connected to a server **700** via a network **1107**. For example, when specific user log-in information for the server **700** is input, the broadcast receiving apparatus **100** may be connected to the server **700** through wired or wireless communication using the network interface **130**.

The home screen information stored in the electronic device may be home screen information used by the electronic device. Alternatively, home screen information used by another electronic device may be stored in the electronic device connected to the broadcast receiving apparatus **100**.

For example, when the mobile device **600***c* approaches the broadcast receiving apparatus **100** within a certain distance to perform tagging as illustrated in FIG. **12**(*a*), the mobile device **600***c* may store home screen information for a user of the mobile device **600***c*.

As another example, when the broadcast receiving apparatus **100** is connected to the server **700** via the network **1107** due to specific user log-in information of the broadcast receiving apparatus **100** as illustrated in FIG. **11**C, the server **700** may store home screen information of a mobile device **600***a* used by a specific user. As will be described below, the server **700** may transmit the home screen information of the mobile device **600***a* used by the specific user, to the broadcast receiving apparatus **100**.

The home screen information may include a background image and a plurality of execution items. For example, FIG. **10**(*a*) illustrates that a main home screen **1010** is displayed on a mobile device **600***a* as the home screen information. The main home screen **1010** of FIG. **10**(*a*) may include a background image **1011** and a plurality of application items **1012**. While the main home screen **1010** is being displayed on the mobile device **600***a* as illustrated in FIG. **10**(*a*), if a screen switch command is received, screens may be switched and a first sub home screen including another background image and additional application items may be displayed. Then, another sub home screen may be displayed according to user settings and input.

In this specification, the home screen information may include the main home screen **1010** including the background image **1011** and the application items **1012** as illustrated in FIG. **10**(*a*), and a sub home screen (not shown) including another background image and additional application items.

Since the home screen information includes a background image and a plurality of execution items, the home screen information may be referred to as home launcher information or home screen launcher information. In the following description, the term 'home screen information' is used for simplicity.

Then, the broadcast receiving apparatus **100** receives the home screen information from the connected electronic device (S**820**).

For example, when the mobile device **600***c* and the broadcast receiving apparatus **100** are connected to each other through NFC as illustrated in FIG. **12**(*a*), the network interface **130** of the broadcast receiving apparatus **100** may receive the home screen information of the mobile device **600***c* using an NFC module.

To receive the home screen information, the mobile device **600***c* may be in an external transfer mode for transmitting its home screen information outside the mobile device **600***c*. When the mobile device **600***c* is in an external transfer mode, the home screen information for the user of the mobile device **600***c* is stored in an NFC module of the mobile device **600***c*. When tagging is performed between the mobile device **600***c* and the broadcast receiving apparatus **100**, the network interface **130** of the broadcast receiving apparatus **100** may receive the home screen information of the mobile device **600***c* through the NFC module.

As another example, when the broadcast receiving apparatus **100** is connected to the server **700** due to the specific user log-in information as illustrated in FIG. **11**C, the network interface **130** of the broadcast receiving apparatus **100** may receive the home screen information of the mobile device **600***a* used by the specific user, which is stored in the server **700**.

To receive the home screen information, the mobile device **600***a* used by the specific user may enter an external transfer mode as illustrated in FIG. **11**B. As such, the mobile device **600***a* used by the specific user may transmit the home screen information of the mobile device **600***a* to the server **700** via a network **1105**. When the broadcast receiving apparatus **100** is connected to the server **700** due to the specific user log-in information as illustrated in FIG. **11**C, the broadcast receiving apparatus **100** may receive the home screen information of the mobile device **600***a* via the network **1107** from the server **700**.

Then, the broadcast receiving apparatus **100** scales at least one of the background image and the execution items of the home screen information (S**830**).

The controller **170** of the broadcast receiving apparatus **100** may scale at least one of the background image and the execution items of the home screen information received through the network interface **130**.

For example, when a home screen is received, if information about an electronic device in which the home screen is used, more particularly, screen setting information of the electronic device, is also received, the controller **170** of the broadcast receiving apparatus **100** may scale at least one of the background image and the execution items of the received home screen information in consideration of screen setting information of the broadcast receiving apparatus **100** and the screen setting information of the electronic device. Preferably, the controller **170** may scale both the background image and the execution items.

Here, the screen setting information may include at least one of resolution information, landscape mode/portrait mode information, aspect ratio information, and width and height information.

Scaling of a home screen may include at least one of changing of an aspect ratio of the home screen, switching between a landscape mode and a portrait mode of the home screen, and resizing of a background image, execution item images, or text in the home screen.

The scaling of the home screen may further include scaling of only a part of the background image of the home screen, or scaling of only a few of the execution items of the home screen.

The scaling may be performed optionally according to user input. Furthermore, a part of the home screen may be separated according to user settings and only the separated part may be scaled.

Then, the broadcast receiving apparatus **100** displays a home screen including the scaled background image or execution items (S**840**).

The controller **170** of the broadcast receiving apparatus **100** controls the display **180** to display the home screen including the scaled background image or execution items.

For example, as illustrated in FIG. **10**(*b*), a home screen **1020** scaled from the main home screen **1010** of the mobile device **600***b* of FIG. **10**(*a*) may be displayed on the display **180** of the broadcast receiving apparatus **100**.

As such, a home screen used by a specific user may be shared among a plurality of electronic devices and thus user convenience may be improved.

Particularly, since a home screen of a mobile device may be used as a home screen of a broadcast receiving apparatus (e.g., TV), a user may use the broadcast receiving apparatus as if the user uses the mobile device.

If a shared home screen display command is received while a certain image is being displayed, the home screen may be displayed. In this case, if there are a plurality of home screens, a home screen related to the displayed image may be displayed. For example, if a shared home screen display command is received while a sport image is being viewed, a home screen including the sport image or a home screen including an execution item related to sports may be selected and displayed among a plurality of home screens.

Meanwhile, a home screen may be displayed together with a broadcast image. As such, at least one of the broadcast image and the scaled home screen may be displayed translucently.

Alternatively, only a part of the scaled home screen may be displayed. For example, only a part of the scaled home screen may be displayed together with the broadcast image according to user input. As such, the part of the scaled home screen may be checked briefly while viewing the broadcast image.

A detailed description is now given of the method of FIG. **8** with reference to FIGS. **9** to **17**.

FIG. **9** illustrates an example of a home screen shared between a mobile device and the broadcast receiving apparatus **100**.

FIG. **9**(*a*) illustrates a home screen **910** of the first mobile device **600***a* used by a first user (for example, father). The home screen **910** may include a background image **911** and a plurality of execution items **912**. Although not marked with reference numerals in FIG. **9**(*a*), the execution items **912** include a folder item, a music item, an Internet item, an image item, a messenger item, a camera item, and a video item. When one of these execution items **912** is selected, a corresponding operation may be performed.

FIG. **9**(*b*) illustrates a home screen **920** of the broadcast receiving apparatus **100** (e.g., TV) used by the first user, which is scaled, for example, enlarged from the home screen **910** of FIG. **9**(*a*).

A home screen may be shared between the first mobile device **600***a* and the broadcast receiving apparatus **100** through one-to-one data sharing due to, for example, NFC, or via an external server, as described above.

Specifically, the home screen **920** FIG. **9**(*b*) may include an enlarged background image **921** and a plurality of enlarged execution items **922** compared to FIG. **9**(*a*).

Meanwhile, due to a difference in resolution between a mobile device and the broadcast receiving apparatus **100**, a difference in processing speed or processable data between execution items, whether an execution item supports various resolutions, etc., an item executable in the mobile device may not be executable in the broadcast receiving apparatus **100**.

In this case, the controller **170** of the broadcast receiving apparatus **100** may determine inexecutable items among execution items of received home screen information, and control the determined inexecutable items to be displayed distinguishably from other items when a home screen is displayed.

Here, the distinguishable displaying may include displaying the inexecutable items as disabled items, displaying the executable items as enabled items, or a combination thereof. Alternatively, the distinguishable displaying may include highlighting or not displaying the inexecutable items.

FIG. **9**(*b*) illustrates that objects **932**, **934**, **936**, and **938** indicating that the folder item, the music item, the Internet item, and the image item among a plurality of execution items are inexecutable are displayed near the corresponding items. As such, a user may easily check inexecutable items when a home screen is shared.

FIG. **10** illustrates another example of a home screen shared between a mobile device and the broadcast receiving apparatus **100**.

FIG. **10**(*a*) illustrates a home screen **1010** of the second mobile device **600***b* used by a second user (for example, son). The home screen **1010** may include a background image **1011** and a plurality of execution items **1012**. A plurality of application items are illustrated as the execution items **1012** in FIG. **10**(*a*).

FIG. **10**(*b*) illustrates a home screen **1020** of the broadcast receiving apparatus **100** (e.g., TV) used by the second user, which is scaled, for example, enlarged from the home screen **1010** of FIG. **10**(*a*).

A home screen may be shared between the second mobile device **600***b* and the broadcast receiving apparatus **100** through one-to-one data sharing due to, for example, NFC, or via an external server, as described above.

Specifically, the home screen **1020** FIG. **10**(*b*) may have an enlarged background image **1021** and a plurality of enlarged execution items **1022** compared to FIG. **10**(*a*).

Meanwhile, although not shown in FIG. **10**, similarly to FIG. **9**, due to a difference in resolution between a mobile device and the broadcast receiving apparatus **100**, a difference in processing speed or processable data between execution items, whether an execution item supports various resolutions, etc., an item executable in the mobile device may not be executable in the broadcast receiving apparatus **100**.

In this case, the controller **170** of the broadcast receiving apparatus **100** may determine inexecutable application items among execution items of received home screen information, and control the determined inexecutable application items to be highlighted or not displayed when a home screen is displayed.

FIG. **11** illustrates an example of a method for sharing a home screen between a mobile device and the broadcast receiving apparatus **100**.

Like FIG. **9**(*a*), FIG. **11**A illustrates a home screen **910** of the mobile device **600***a* of the first user.

When a home screen share mode command or a home screen external transfer mode command input by the first user is received, the mobile device **600***a* may display an object **1110** indicating to transmit the home screen **910** to the server **700**, and transmit home screen information to the server **700**, as illustrated in FIG. **11**B.

FIG. **11**C illustrates an object **1120** indicating to enter a home screen receive mode is displayed on the broadcast receiving apparatus **100** when a home screen receive mode command is received according to user input.

In the home screen receive mode, if a user is not logged in the server **700**, a user account selection screen **1130** may be displayed as illustrated in FIG. **11**D.

The user account selection screen **1130** in this case may include a plurality of user account items **1132**, **1134**, and **1135** for the server **700** as illustrated in FIG. **11**D. If the user account item **1134** of the first user (e.g., father@mail.com) is selected, log-in information (e.g., ID and password) of the first user may be transmitted to the server **700**, and the broadcast receiving apparatus **100** may be connected to the server **700**.

Then, the broadcast receiving apparatus **100** connected to the server **700** may select and receive the home screen **910** corresponding to the logged-in first user.

FIG. **11**D illustrates that the remote controller **200** is used to select one of the user account items **1132**, **1134**, and **1135**. For example, any one of the user account items **1132**, **1134**, and **1135** may be focused and selected according to direction key input, touch input, motion input, etc.

Unlike FIG. **11**D, the user account selection screen **1130** may include user account items for the broadcast receiving apparatus **100**. In this case, the user account items for the broadcast receiving apparatus **100** may be associated with the user account items **1132**, **1134**, and **1135** for the server **700** in advance. As such, when one of the user account items for the broadcast receiving apparatus **100** is selected, log-in information of a user corresponding to the selected user account item may be transmitted directly to the server **700** without selecting one of the user account items **1132**, **1134**, and **1135** for the server **700**, and thus the broadcast receiving apparatus **100** may be connected to the server **700**.

FIG. **11**E illustrates that a home screen **920** which is scaled, for example, enlarged from the home screen **910** of FIG. **11**A is displayed on the broadcast receiving apparatus **100** (e.g., TV). The enlarged home screen **920** is a screen enlarged from the home screen **910** of the mobile device **600***a* of the first user (e.g., father).

If a few items of the enlarged home screen **920** are inexecutable in the broadcast receiving apparatus **100** (e.g., TV), the inexecutable items may be highlighted.

FIG. **11**E illustrates that objects **932**, **934**, **936**, and **938** indicating that a folder item, a music item, an Internet item, and an image item among a plurality of execution items are inexecutable are displayed near the corresponding items. As such, a user may easily check inexecutable items when a home screen is shared.

FIG. **12** illustrates another example of a method for sharing a home screen between a mobile device and the broadcast receiving apparatus **100**.

FIG. **12**(*a*) illustrates that, while a home screen **1210** is being displayed on the third mobile device **600***c* used by a third user (e.g., mother), the third mobile device **600***c*

approaches the broadcast receiving apparatus **100** within a certain distance to perform tagging.

In this case, the third mobile device **600***c* may enter a home screen share mode. As such, home screen information of the third mobile device **600***c* may be transmitted to the broadcast receiving apparatus **100** through NFC.

FIG. **12**(*b*) illustrates that a user account for the server **700** is selected on the broadcast receiving apparatus **100**.

Similarly to FIGS. **11**A to **11**E, when the third mobile device **600***c* used by the third user (e.g., mother) enters a home screen share mode, the third mobile device **600***c* may transmit the home screen **1210** of the third mobile device **600***c* to the server **700**.

In this state, if the user account item **1135** of the third user (e.g., mather@mail.com) for the server **700** is selected on the broadcast receiving apparatus **100** as illustrated in FIG. **12**(*b*), the broadcast receiving apparatus **100** may be connected to the server **700** to correspond to the selected user account item **1135**, and receive the home screen **1210** from the server **700**.

FIG. **12**(*c*) illustrates that a home screen **1220**, which is scaled, for example, enlarged from that of FIG. **12**(*a*) after home screen sharing is performed as illustrated in FIG. **12**(*a*) or FIG. **12**(*b*), is displayed on the broadcast receiving apparatus **100** (e.g., TV) used by the third user. The enlarged home screen **1220** may include an enlarged background image **1221** and a plurality of enlarged application items **1222** compared to FIG. **12**(*a*).

In this case, although not shown in FIG. **12**(*c*), inexecutable application items may be displayed distinguishably from other items.

FIG. **13** illustrates another example of a home screen shared between a mobile device and the broadcast receiving apparatus **100**.

Referring to FIG. **13**, the mobile device **600***b* and the broadcast receiving apparatus **100**, which are used by the second user, may share a home screen.

A home screen **1320** of the broadcast receiving apparatus **100** of FIG. **13** enlarges a background image **1311** and a plurality of application items **1312** of a home screen **1310** of the mobile device **600***b*. Specifically, application icons of the application items **1312**, text indicating application names, etc. may be enlarged.

A few of the application items **1312** executable in the mobile device **600***b* may be inexecutable in the broadcast receiving apparatus **100** (e.g., TV. In this case, the user may be induced to download TV application items the same as or similar to the inexecutable application items.

The home screen **1320** of the broadcast receiving apparatus **100** of FIG. **13** may further include downloadable items **1332**, **1334**, and **1336**, and recommended items **1342** and **1344**.

The downloadable items **1332**, **1334**, and **1336** are TV application items downloadable from the server **700** or the like, and may correspond to the mobile device application items inexecutable in TV.

The recommended items **1342** and **1344** are TV application items downloadable from the server **700** or the like, and may be TV application items similar to the mobile device application items inexecutable in TV.

As such, application items used by a mobile device may be shared with the broadcast receiving apparatus **100**, application items unusable in TV may be replaced with the same or similar application items for broadcast receiving apparatuses, and thus user convenience may be improved.

FIG. **14** illustrates another example of a home screen shared between a mobile device and the broadcast receiving apparatus **100**.

When the broadcast receiving apparatus **100** is used by the second user, the second user may be logged in automatically using the camera **195**, or according to additional selection of a user account. In this case, the logging in may include logging in the broadcast receiving apparatus **100** and logging in the server **700**.

If the second user sets viewing information to be shared when a content image such as a broadcast image is viewed on the broadcast receiving apparatus **100**, the viewing information may be transmitted to the server **700**.

As such, the server **700** may collect viewing information from users of a plurality of broadcast receiving apparatuses and calculate viewer ratings or the like. In addition, the server **700** may analyze a viewing pattern of each user and recommend contents suitable for the user.

As illustrated in FIG. **14**, the recommended contents may be displayed when a home screen is shared.

Similarly to FIG. **13**, FIG. **14** illustrates that a home screen **1420** of the broadcast receiving apparatus **100** enlarges the background image **1311** and the application items **1312** of the home screen **1310** of the mobile device **600***b*.

A few of the application items **1312** executable in the mobile device **600***b* may be inexecutable in the broadcast receiving apparatus **100** (e.g., TV. As illustrated in FIG. **14**, the display **180** of the broadcast receiving apparatus **100** may replace the inexecutable application items with recommended video items **1432**, **1434**, and **1436**, recommended game items **1442** and **1444**, a recommended application item **1446**, etc. As such, a user may easily download contents suitable for a viewing pattern of the user.

In FIGS. **13** and **14**, when a shared home screen is displayed on the broadcast receiving apparatus **100**, items inexecutable in the broadcast receiving apparatus **100** may be replaced with message items provided by the server **700** or the mobile device **600**. The message items provided by the server **700** or the mobile device **600** may include, for example, a notification message, a schedule message associated with a scheduler, etc. set by the mobile device **600**.

Alternatively, these message items may be displayed additionally instead of replacing the inexecutable items. That is, while a shared home screen is being displayed on the broadcast receiving apparatus **100**, when a set time comes, a notification message may be received from the server **700** and displayed on an additional message display window. In this case, the message display window may be overlapped with the displayed home screen.

On the contrary, a notification message, a schedule message associated with a scheduler, etc. set by the broadcast receiving apparatus **100** may be transmitted to the server **700**. Broadcast viewing reservation information, etc. set by the broadcast receiving apparatus **100** may also be transmitted to the server **700**. The message, information, etc. transmitted to the server **700** may be transmitted to a mobile device used by the same user. As such, a user may easily check a message, information, etc. set by another device, using a mobile device.

FIG. **15** illustrates that home screens for a plurality of users are displayed on the broadcast receiving apparatus **100**.

In a home screen receive mode of the broadcast receiving apparatus **100**, if a user is not logged in the server **700**, the user account selection screen **1130** may be displayed as illustrated in FIG. **15**(*a*). In this case, a plurality of user accounts may be selected.

FIG. **15**(*a*) illustrates that a user account of the second user (e.g., son) and a user account of the third user (e.g., mother) are selected.

Thus, the broadcast receiving apparatus **100** may be connected to the server **700** using the user account of the second

user (e.g., son) and the user account of the third user (e.g., mother) and receive home screen information for the second user (e.g., son) and home screen information for the third user (e.g., mother) together from the server **700**.

As such, the display **180** of the broadcast receiving apparatus **100** may display a home screen **1520** for the second user (e.g., son) and a home screen **1510** for the third user (e.g., mother) together as illustrated in FIG. **15**(*b*). Although the home screens **1510** and **1520** are displayed in different regions in FIG. **15**(*b*), the two home screens **1510** and **1520** may be overlapped with each other. As such, a user may easily check a plurality of pieces of home screen information.

FIG. **16** illustrates an example of setting authority of a plurality of user accounts of the broadcast receiving apparatus **100**.

Referring to FIG. **16**, to select a user account, the user account selection screen **1130** may be displayed. FIG. **16**(*a*) illustrates that a user account of the third user (e.g., mother) is selected.

Thus, as illustrated in FIG. **16**(*b*), an authority setting screen **1610** for a plurality of user accounts may be displayed. In this case, an object **1612** indicating that the third user (e.g., mother) is logged in may be displayed.

The authority setting screen **1610** may include an authority setting item **1614** for a plurality of user accounts, and specific settings **1616** for each user account.

In FIG. **16**(*b*), the specific settings **1616** include "No watching TV after 12:00" and "No game after 10:00" for the second user (e.g., son), and "No watching TV after 2:00" for the first user (e.g., father).

As such, authority of each user for the broadcast receiving apparatus **100** may be set.

Although not shown in FIG. **16**, the third user (e.g., mother) is a master user and may execute all functions related to the broadcast receiving apparatus **100**.

FIG. **17** illustrates that a user having master setting authority among users of the broadcast receiving apparatus **100** views information of other users.

If the first user (e.g., father) and the second user (e.g., son) agree on a monitoring function in advance, as illustrated in FIG. **17**, a call log screen **1712** of the mobile device **600***b* used by the second user (e.g., son) and a messenger screen **1722** of the mobile device **600***a* used by the first user (e.g., father) may be shared with the server **700** or directly with the broadcast receiving apparatus **100**.

When the third user (e.g., mother) using the broadcast receiving apparatus **100** selects a monitoring mode, the broadcast receiving apparatus **100** may enter the monitoring mode and receive the messenger screen **1722** and the call log screen **1712** from the server **700** or directly from the mobile device **600***a* and the mobile device **600***b*.

Then, the broadcast receiving apparatus **100** may scale the received messenger screen **1722** and the call log screen **1712**, and display a scaled messenger screen **1720** and a call log screen **1710** together on the display **180**. Although the scaled messenger screen **1720** and the call log screen **1710** are displayed in different regions in FIG. **17**, the messenger screen **1720** and the call log screen **1710** may be overlapped with each other. As such, a user may easily check screen information of a mobile device of each user.

FIG. **18** is a flowchart of a method for operating the broadcast receiving apparatus **100**, according to another embodiment of the present invention, and FIGS. **19** to **21** are diagrams referred to for describing the method of FIG. **18**.

Referring to FIG. **18**, the broadcast receiving apparatus **100** displays a broadcast image (S**1810**).

The broadcast receiver **105** of the broadcast receiving apparatus **100** receives a broadcast signal, and the controller **170** controls the display **180** to display a broadcast image processed based on the broadcast signal.

FIG. **19**A illustrates that a certain broadcast image **1910** is displayed on the display **180** of the broadcast receiving apparatus **100**.

Then, the broadcast receiving apparatus **100** transmits viewing information of the broadcast image to the server **700** (S**1820**). If the broadcast receiving apparatus **100** is in a broadcast image viewing information share mode, the network interface **130** transmits viewing information of the broadcast image which is currently viewed, to the server **700**.

Here, the viewing information of the broadcast image may include channel information, program information, a viewing time, etc. of the broadcast image. User information a user who is watching the broadcast image may also be transmitted. The user information may be transmitted to the server **700** if the user is logged in the broadcast receiving apparatus **100**. The user may be logged in based on an image captured by the camera **195**, or using a user account selection screen, as described above.

FIG. **19**A illustrates that, while a certain broadcast image **1910** is being displayed on the display **180** of the broadcast receiving apparatus **100**, viewing information Inf1 of the broadcast image **1910** is transmitted to the server **700**.

The server **700** may generate recommended content information Inf2 including applications, news, recommended videos, etc. related to the broadcast image **1910**, based on the viewing information Inf1 received from the broadcast receiving apparatus **100**. Then, the server **700** may transmit the recommended content information Inf2 to the broadcast receiving apparatus **100**.

Thus, the broadcast receiving apparatus **100** receives the recommended content information Inf2 related to the viewing information Inf1 from the server **700** (S**1830**).

FIG. **19**B illustrates that the network interface **130** of the broadcast receiving apparatus **100** receives the recommended content information Inf2 including applications, news, recommended videos, etc., from the server **700**.

Then, the broadcast receiving apparatus **100** displays recommended contents together with the broadcast image (S**1840**).

The controller **170** of the broadcast receiving apparatus **100** processes the received recommended content information Inf2 and controls the display **180** to display the recommended content information Inf2.

In this case, recommended content information **1920** corresponding to the recommended content information Inf2 and including a recommended application item **1922**, a related news item **1924**, and a recommended video item **1926** may be displayed on the display **180** together with the broadcast image **1910**.

Particularly, if a recommended content information display command is received according to user input, the recommended content information **1920** may be displayed on an edge region, which is less critical, so as not to disturb viewing of the broadcast image **1910**.

Alternatively, unlike FIG. **19**B, recommended content information **1930** may be displayed on the mobile device **600***a* used by a user who is watching the broadcast receiving apparatus **100**.

FIG. **19**C illustrates that, when the first user (e.g., father) is logged in the broadcast receiving apparatus **100** and watches the broadcast image **1910** on the broadcast receiving apparatus **100**, the recommended content information **1930** is dis-

played on the mobile device **600***a* of the first user (e.g., father) not to disturb viewing of the broadcast image **1910**.

In this case, the mobile device **600***a* may receive the recommended content information Inf2 for the first user from the server **700**, and thus display the recommended content information **1930** including a recommended application item **1932**, a related news item **1934**, and a recommended video item **1936**.

The recommended content information **1930** displayed on the mobile device **600***a* may be reduced from the recommended content information **1930** displayed on the broadcast receiving apparatus **100** of FIG. **19**B.

FIG. **20** is similar to FIG. **19** and illustrates that, while a broadcast image **2010** is being viewed using the broadcast receiving apparatus **100**, information about locations, actors/actresses, and products related to the broadcast image **2010** is displayed on the mobile device **600***c*.

Although not shown in FIG. **20**, similarly to FIG. **19**, if the broadcast receiving apparatus **100** is in a product recommend mode related to the broadcast image **2010**, viewing information of the broadcast image **2010** may be transmitted to the server **700** and the information about locations, actors/actresses, and products related to the broadcast image **2010** may be transmitted from the server **700** to the broadcast receiving apparatus **100** or the mobile device **600***c*. In this case, the mobile device **600***c* may be a mobile device of the third user using the broadcast receiving apparatus **100**.

As such, the mobile device **600***c* may display recommended content information **2030** including a related location item **2032**, a related product item **2034**, and a related actor/actress item **2036**.

FIG. **21** is similar to FIG. **20** and illustrates that, while the broadcast image **2010** is being viewed using the broadcast receiving apparatus **100**, an SMS message, a notification message, etc. received by the mobile device **600***c* is displayed on the broadcast receiving apparatus **100**.

Although not shown in FIG. **21**, similarly to FIG. **19**, if a message share mode is set between the broadcast receiving apparatus **100** and the mobile device **600***c* used by the third user, an SMS message, a notification message, etc. may be transmitted from the mobile device **600***c* or the server **700**, to the broadcast receiving apparatus **100**.

Specifically, FIG. **21** illustrates that the mobile device **600***c* displays a message screen including an SMS message **2132**, a schedule notification message **2134**, and a messenger message **2136**.

Thus, as illustrated in FIG. **21**, the broadcast receiving apparatus **100** may display a message **2120** including an SMS message, a notification message, a messenger message, etc., together with the broadcast image **2010**.

Although FIGS. **19**A to **21** illustrate transmission of viewing information of a broadcast image and display of recommended contents in a case when a single user is logged in the broadcast receiving apparatus **100**, the above description may be extended to a case when a plurality of users are logged in the broadcast receiving apparatus **100**, as illustrated in FIG. **15**.

For example, if the second user (e.g., son) and the third user (e.g., mother) are logged in the broadcast receiving apparatus **100** as illustrated in FIG. **15**(*a*), the broadcast receiving apparatus **100** may transmit viewed broadcast image information and user information together to the server **700**.

The server **700** may select recommended contents in consideration of a viewing history of each user as well as the broadcast image information currently viewed by the user, and transmit recommended content information for each user to the broadcast receiving apparatus **100**.

As such, the broadcast receiving apparatus **100** may display the received recommended content information together with a broadcast image for each user.

The recommended content information for each user may be transmitted to the corresponding mobile device **600***b* or **600***c* in addition to the broadcast receiving apparatus **100**. As such, each user may easily check recommended contents suitable for a broadcast image currently viewed by the user or a viewing history of the user, on the mobile device **600***b* or **600***c* of the user.

FIG. **22** is a flowchart of a method for operating the broadcast receiving apparatus **100**, according to another embodiment of the present invention, and FIGS. **23**A to **28** are diagrams referred to for describing the method of FIG. **22**.

Referring to FIG. **22**, the broadcast receiving apparatus **100** receives a home screen display command from a mobile device **600** (S**2210**). Then, the broadcast receiving apparatus **100** receives user information from the mobile device **600** (S**2220**). Then, the broadcast receiving apparatus **100** displays a home screen for a user of the mobile device **600** among a plurality of home screens based on the home screen display command and the user information (S**2230**).

The network interface **130** or the user input interface **150** of the broadcast receiving apparatus **100** may receive the home screen display command and the user information from the mobile device **600**.

For example, while an application for remotely controlling the broadcast receiving apparatus **100** is being executed in the mobile device **600**, if a power-on command is received, the network interface **130** or the user input interface **150** of the broadcast receiving apparatus **100** may receive the power-on command, and the controller **170** of the broadcast receiving apparatus **100** may control the power supply **190** to power on the display **180**. In this case, the power-on command may correspond to the home screen display command.

After that, the network interface **130** or the user input interface **150** of the broadcast receiving apparatus **100** may request the mobile device **600** to transmit the user information, and receive the user information from the mobile device **600** in response to the request.

The controller **170** of the broadcast receiving apparatus **100** may control connection to the server **700** according to the user information received from the mobile device **600**, and control reception of home screen information related to the user of the mobile device **600** from the server **700**. Specifically, the controller **170** may transmit the user information received from the mobile device **600**, to the server **700** and request the server **700** to transmit home screen information according to the user information. As such, the network interface **130** of the broadcast receiving apparatus **100** may receive the home screen information related to the user of the mobile device **600** from the server **700**.

Then, the controller **170** of the broadcast receiving apparatus **100** may scale at least one of a background image and a plurality of execution items included in the home screen information, and control the display **180** to display a scaled home screen. As described above, a home screen desired by a user may be easily displayed according to a home screen display command received from the mobile device **600**, and thus user convenience may be improved.

As another example, while the broadcast receiving apparatus **100** is being powered on to display a certain image, if a home screen display command is received from the mobile device **600**, the network interface **130** or the user input interface **150** of the broadcast receiving apparatus **100** receives the home screen display command. After that, the network interface **130** or the user input interface **150** of the broadcast

receiving apparatus **100** may request the mobile device **600** to transmit user information, and receive the user information from the mobile device **600** in response to the request.

Then, the broadcast receiving apparatus **100** may receive home screen information related to the user of the mobile device **600** from the server **700** as described above, and switch the displayed certain image into the home screen. As such, a home screen desired by a user may be easily displayed and thus user convenience may be improved

A detailed description is now given of the method of FIG. **22** with reference to FIGS. **23**A to **28**.

FIGS. **23**A to **23**C illustrate an example of home screen sharing between the first mobile device **600***a* and the broadcast receiving apparatus **100**.

FIG. **23**A illustrates a home screen **910** of the first mobile device **600***a* used by the first user (for example, father). The home screen **910** may include a background image **911** and a plurality of execution items **912**. Although not marked with reference numerals in FIG. **23**A, the execution items **912** include a folder item, a music item, an Internet item, an image item, a messenger item, a camera item, and a video item. When one of these execution items **912** is selected, a corresponding operation may be performed.

FIG. **23**B illustrates that an application for remotely controlling the broadcast receiving apparatus **100** is executed in the first mobile device **600***a* and thus a corresponding application screen **901** is displayed. In this case, the application screen **901** may include a power item **902**, a channel selection item, a volume control item, a home screen item, etc.

If the power item **902** of the application screen **901** is selected, a power on signal Spower may be transmitted to the broadcast receiving apparatus **100**. In this case, user information Sinf1 of the first mobile device **600***a* may be transmitted to the broadcast receiving apparatus **100** upon a request of the broadcast receiving apparatus **100**, or even without a request. The controller **170** of the broadcast receiving apparatus **100** may log a user in the broadcast receiving apparatus **100** based on the received user information Sinf1 of the first mobile device **600***a*.

The broadcast receiving apparatus **100** may power on the display **180** or the like according to the power-on signal Spower, and display a home screen. That is, the broadcast receiving apparatus **100** may process the power-on signal Spower as a home screen display command signal.

As such, as illustrated in FIG. **23**C, a home screen **920** which is scaled, for example, enlarged from the home screen **910** of FIG. **23**A may be displayed on the broadcast receiving apparatus **100** (e.g., TV) used by the first user.

The broadcast receiving apparatus **100** may receive home screen information through the server **700** as described above, or directly from the first mobile device **600***a*.

After the home screen information is received, the broadcast receiving apparatus **100** may display the enlarged home screen **920** as illustrated in FIG. **23**C through processing, for example, scaling.

FIGS. **24**A to **24**C illustrate an example of home screen sharing between the second mobile device **600***b* and the broadcast receiving apparatus **100**.

FIG. **24**A illustrates a home screen **1010** of the second mobile device **600***b* used by the second user (e.g., son). The home screen **1010** may include a background image **1011** and a plurality of execution items **1012**. A plurality of application items are illustrated as the execution items **1012** in FIG. **24**A.

FIG. **24**B illustrates that an application for remotely controlling the broadcast receiving apparatus **100** is executed in the second mobile device **600***b* and thus a corresponding application screen **1001** is displayed, and a certain image **1003** is displayed on the broadcast receiving apparatus **100**. In this case, the application screen **1001** may include a power item, a channel selection item, a volume control item, a home screen item **1002**, etc.

If the home screen item **1002** of the application screen **1001** is selected, a home screen switch signal Shome may be transmitted to the broadcast receiving apparatus **100**. In this case, user information Sinf2 of the second mobile device **600***b* may be transmitted to the broadcast receiving apparatus **100** upon a request of the broadcast receiving apparatus **100**, or even without a request. The controller **170** of the broadcast receiving apparatus **100** may log a user in the broadcast receiving apparatus **100** based on the received user information Sinf2 of the second mobile device **600***b*.

The broadcast receiving apparatus **100** may switch a screen displayed on the display **180** according to the home screen switch signal Shome, and display a home screen.

As such, as illustrated in FIG. **24**C, a home screen **1020** which is scaled, for example, enlarged from the home screen **1010** of FIG. **24**A may be displayed on the broadcast receiving apparatus **100** (e.g., TV) used by the second user.

The broadcast receiving apparatus **100** may receive home screen information through the server **700** as described above, or directly from the second mobile device **600***b*.

After the home screen information is received, the broadcast receiving apparatus **100** may display the enlarged home screen **1020** as illustrated in FIG. **24**C through processing, for example, scaling.

FIGS. **25**A to **25**E illustrate an example of a method for sharing a home screen between a mobile device and the broadcast receiving apparatus **100**.

FIG. **25**A illustrates a home screen **910** of the mobile device **600***a* of the first user.

When a home screen share mode command or a home screen external transfer mode command input by the first user is received, the mobile device **600***a* may display an object **910** indicating to transmit the home screen **910** to the server **700**, and transmit home screen information to the server **700**, as illustrated in FIG. **25**B.

FIG. **25**C illustrates an object **1120** indicating to enter a home screen receive mode is displayed on the broadcast receiving apparatus **100** when a home screen display command is received according to user input.

In the home screen receive mode, if a user is logged in the server **700**, an object **1132** indicating to download a home screen corresponding to the logged in user may be displayed as illustrated in FIG. **25**D. Otherwise, if a user is not logged in the server **700**, a user account selection screen may be displayed.

FIG. **25**E illustrates a home screen **920** which is scaled, for example, enlarged from the home screen **910** of FIG. **25**A is displayed on the broadcast receiving apparatus **100** (e.g., TV). The enlarged home screen **920** is a screen enlarged from the home screen **910** of the first mobile device **600***a* of the first user (e.g., father).

If a few items of the enlarged home screen **920** are inexecutable in the broadcast receiving apparatus **100** (e.g., TV), the inexecutable items may be highlighted.

FIG. **25**E illustrates that objects **932**, **934**, **936**, and **938** indicating that a folder item, a music item, an Internet item, and an image item among a plurality of execution items are inexecutable are displayed near the corresponding items. As such, a user may easily check inexecutable items when a home screen is shared.

FIG. **26** illustrates another example of a method for sharing a home screen between a mobile device and the broadcast receiving apparatus **100**.

FIG. **26**(*a*) illustrates that, while an application screen for remotely controlling the broadcast receiving apparatus **100** is being displayed on the third mobile device **600***c* used by the third user (e.g., mother), the third mobile device **600***c* approaches the broadcast receiving apparatus **100** within a certain distance to perform tagging. Particularly, while a power item or a home screen item of the application screen is being selected, if the third mobile device **600***c* approaches the broadcast receiving apparatus **100** within a certain distance to perform tagging, the third mobile device **600***c* may enter a home screen share mode. In this case, user information of the third mobile device **600***c* may be transmitted to the broadcast receiving apparatus **100** through NFC.

The broadcast receiving apparatus **100** may display a home screen **1220** for the third user as illustrated in FIG. **26**(*c*) based on the home screen display command and the user information.

In this case, home screen information for the third user may be transmitted from the third mobile device **600***c* to the broadcast receiving apparatus **100** through NFC. Alternatively, the home screen information may be transmitted from the server **700** to the broadcast receiving apparatus **100**.

FIG. **26**(*b*) illustrates that, while the application screen for remotely controlling the broadcast receiving apparatus **100** is being displayed on the third mobile device **600***c* used by the third user (e.g., mother) as described above, the power item or the home screen item is selected and the home screen display command is received by the broadcast receiving apparatus **100** in a wireless manner. In this case, the user information of the third mobile device **600***c* may be transmitted to the broadcast receiving apparatus **100** through wireless communication.

The broadcast receiving apparatus **100** may display the home screen **1220** for the third user as illustrated in FIG. **26**(*c*) based on the home screen display command and the user information.

The home screen **1220** of FIG. **26**(*c*) may correspond to a home screen used by the third user in the third mobile device **600***c*. FIG. **26**(*c*) illustrates the scaled, for example, enlarged home screen **1220** is displayed on the broadcast receiving apparatus **100** (e.g., TV). The enlarged home screen **1220** may include an enlarged background image **1221** and a plurality of enlarged application items **1222**.

In this case, although not shown in FIG. **26**(*c*), inexecutable application items may be displayed distinguishably from other items.

FIGS. **27**A and **27**B are diagrams referred to for describing sharing of home screen information by editing a home screen.

FIG. **27**A illustrates that a home edit screen **1301** is displayed on the broadcast receiving apparatus **100**. The home edit screen **1301** may be displayed according to user input and include a favorite channel item **1302**, a brightness item **1304**, a volume item **1306**, etc. In addition, the home edit screen **1301** may further include an item for adding or deleting an executable application item.

FIG. **27**A illustrates that channel '13' is added in the favorite channel item **1302** according to user input. When editing is completed on the home edit screen **1301**, changed setting information may be transmitted to the first mobile device **600***a* used by the first user, directly or through the server **700**.

As described above, home screen settings may be edited on the broadcast receiving apparatus **100** and shared by a mobile device, and thus user interaction may be achieved.

FIG. **27**B illustrates that a home edit screen **1307** is displayed on the first mobile device **600***a*. Similarly to FIG. **27**A, the home edit screen **1307** may be displayed according to user input and include a favorite channel item, a brightness item, a volume item, etc. In addition, the home edit screen **1307** may further include an item for adding or deleting an executable application item.

When editing is completed on the home edit screen **1307**, changed setting information may be transmitted to the broadcast receiving apparatus **100** used by the first user, directly or through the server **700**.

As described above, home screen settings may be edited on the broadcast receiving apparatus **100** and shared by a mobile device, and thus user interaction may be achieved.

Meanwhile, the broadcast receiving apparatus **100** may receive screen display setting information from the mobile device **600**. In this case, the screen display setting information may include at least one of luminance, brightness, and contrast of a screen, and may further include volume setting information, favorite channel setting information, etc.

The screen display setting information may be received together with or separately from the home screen information. For example, the broadcast receiving apparatus **100** may receive the screen display setting information from the server **700** in addition to the home screen information. Alternatively, the broadcast receiving apparatus **100** may receive the home screen information from the server **700** based on a home screen display command and user information, and additionally receive the screen display setting information from the server **700**. Otherwise, the broadcast receiving apparatus **100** may receive the screen display setting information together with the home screen information from the server **700**.

The controller **170** of the broadcast receiving apparatus **100** may set and display at least one of the luminance, the brightness, and the contrast of a displayed screen, based on the received screen display setting information. In addition, the controller **170** of the broadcast receiving apparatus **100** may set volume and favorite channels. As such, a screen may be displayed according to screen display settings suitable for or preset by a user, and thus user convenience may be improved.

FIG. **28** illustrates that home screens for a plurality of users are displayed on the broadcast receiving apparatus **100**.

If a home screen display command is received from the second mobile device **600***b* of the second user and another home screen display command is received from the third mobile device **600***c* of the third user, the broadcast receiving apparatus **100** may display at least one of a home screen of the second user and a home screen of the third user.

Thus, the broadcast receiving apparatus **100** may be connected to the server **700** using a user account of the second user (e.g., son) and a user account of the third user (e.g., mother), and receive home screen information of the second user (e.g., son) and home screen information of the third user (e.g., mother) together from the server **700**.

As such, the display **180** of the broadcast receiving apparatus **100** may display a home screen **1520** of the second user (e.g., son) and a home screen **1510** of the third user (e.g., mother) together as illustrated in FIG. **28**. Although the home screens **1510** and **1520** are displayed in different regions in FIG. **28**, the two home screens **1510** and **1520** may be overlapped with each other. As such, a user may easily check a plurality of pieces of home screen information.

While the home screen **1510** of the third user (e.g., mother) is being displayed, if the home screen display command is received from the second mobile device **600***b* of the second user, the home screens **1510** and **1520** may be displayed together as illustrated in FIG. **28**.

As is apparent from the above description, a broadcast receiving apparatus according to an embodiment of the present invention may receive home screen information

including a background image and a plurality of execution items from another electronic device, and thus display a home screen corresponding to the home screen information. That is, the broadcast receiving apparatus may receive a shared home screen from another electronic device, scale and convert the received home screen to be suitable for the broadcast receiving apparatus, and display the converted home screen. As such, a home screen used by a specific user may be shared among a plurality of electronic devices and thus user convenience may be improved.

Particularly, since a home screen of a mobile device may be used as a home screen of a broadcast receiving apparatus (e.g., TV), the user may use the broadcast receiving apparatus as if the user uses the mobile device.

When a shared home screen is displayed, inexecutable items may be displayed distinguishably from other items and thus the user may easily check the inexecutable items.

Furthermore, when the shared home screen is displayed, the inexecutable items may be replaced with the same or similar execution items and thus user convenience may be improved.

In addition, viewing information related to a broadcast image which is currently viewed may be transmitted to a server, recommended contents may be received from the server, and the recommended contents may be replaced with the inexecutable items when the shared home screen is displayed. As such, contents suitable for a viewing history of the user may be easily executed.

A broadcast receiving apparatus according to another embodiment of the present invention receives user information of a user of a mobile device if a home screen display command is received from the mobile device, and displays a home screen for the user of the mobile device based on the user information. As such, a user-desired home screen may be easily displayed and thus user convenience may be improved.

In this case, the broadcast receiving apparatus may receive home screen information including a background image and a plurality of execution items from a server, scale and convert at least one of the background image and the execution items to be suitable for the broadcast receiving apparatus, and display the converted home screen. As such, a home screen used by the mobile device may be shared and thus user convenience may be improved.

Particularly, since a home screen of a mobile device may be used as a home screen of a broadcast receiving apparatus (e.g., TV), the user may use the broadcast receiving apparatus as if the user uses the mobile device.

When the broadcast receiving apparatus is powered off, if a home screen display command is received, the home screen may be displayed immediately after the broadcast receiving apparatus is powered on, and thus user convenience may be improved.

Besides, screen display setting information set by the mobile device may be received, at least one of luminance, brightness, and contrast of a displayed screen may be set according to the received screen display setting information, and thus screen display settings desired by the user may be easily achieved.

In addition, home screen information set on a home edit screen may be transmitted to the server, and thus the home screen information set by the broadcast receiving apparatus may also be used by the mobile device.

When a shared home screen is displayed, inexecutable items may be displayed distinguishably from other items and thus the user may easily check the inexecutable items.

Furthermore, when the shared home screen is displayed, the inexecutable items may be replaced with the same or similar execution items and thus user convenience may be improved.

A broadcast receiving apparatus and a method for operating the same according to the present invention are not restricted to the exemplary embodiments set forth herein. Therefore, variations and combinations of the exemplary embodiments may fall within the scope of the present invention.

A method for operating a broadcast receiving apparatus according to the present invention can also be embodied as processor-readable code on a processor-readable recording medium. The processor-readable recording medium is any data memory device that can store data which can thereafter be read by a processor included in the broadcast receiving apparatus. Examples of the processor-readable recording medium include read-only memory (ROM), random-access memory (RAM), CD-ROMs, magnetic tapes, floppy disks, and optical data memory devices. The processor-readable recording medium can also be distributed over network coupled computer systems so that the processor-readable code is stored and executed in a distributed fashion.

Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A broadcast receiving apparatus comprising:

a display;

an interface configured to:

access a mobile device that stores home screen information comprising a background image and a plurality of execution items, and

receive the home screen information from the mobile device; and

a controller configured to:

scale the background image and the execution items of the home screen information received from the mobile device, at least one execution item of the plurality of execution items not being executable by the broadcast receiving apparatus based on a difference in type between the mobile device and the broadcast receiving apparatus,

display a home screen comprising the scaled background image and execution items, wherein the at least one execution item that is not executable by the broadcast receiving apparatus is displayed distinguishably from the execution items that are executable by the broadcast receiving apparatus, and

display a recommended download object indicating that a same or similar execution item corresponding to the at least one execution item is downloadable from a server,

wherein the controller receives home screen information of a first mobile device and home screen information of a second mobile device, and controls the display to display a scaled first home screen for the first mobile device together with a scaled second home screen for the second mobile device.

2. The broadcast receiving apparatus according to claim **1**, wherein the interface transmits log-in information of a first user to the server, and receives home screen information for the first user from the server.

3. The broadcast receiving apparatus according to claim **2**, wherein, when the log-in information of the first user is

received, the controller logs the first user into the broadcast receiving apparatus based on the log-in information, and automatically accesses the server based on the logging into the broadcast receiving apparatus.

4. The broadcast receiving apparatus according to claim **1**, wherein the interface receives the home screen information for a user of the mobile device based on tagging performed in response to a mobile device approaching within a predetermined distance away from the broadcast receiving apparatus.

5. The broadcast receiving apparatus according to claim **1**, further comprising a broadcast receiver configured to receive a broadcast signal,

wherein the display displays a broadcast image based on the received broadcast signal,

wherein the interface transmits viewing information related to the displayed broadcast image, to a server, and receives recommended content information that is related to the displayed broadcast image from the server, and

wherein the display displays the recommended content information together with the displayed broadcast image.

6. The broadcast receiving apparatus according to claim **1**, wherein, when the interface receives a home screen display command and user information from a mobile device, the controller controls the display to display a home screen for a user of the mobile device among a plurality of home screens based on the home screen display command and the user information.

7. A broadcast receiving apparatus comprising:

a display;

an interface configured to:

receive a home screen display command from a mobile device and user information from the mobile device, and

receive home screen information comprising a background image and a plurality of execution items for the user of the mobile device from the mobile device or a server based on the home screen display command and the user information; and

a controller configured to:

scale the background image and the execution items of the home screen information received from the mobile device, at least one execution item of the plurality of execution items is not being executable by the broadcast receiving apparatus based on a difference in type between the mobile device and the broadcast receiving apparatus,

display a home screen comprising the scaled background image and execution items, wherein the at least one execution item that is not executable by the broadcast receiving apparatus is displayed distinguishably from the execution items that are executable by the broadcast receiving apparatus, and

display a recommended download object indicating that a same or similar execution item corresponding to the at least one execution item is downloadable from a server,

wherein, when the home screen is displayed, if a second home screen display command is received from a second mobile device, the controller controls the display to display the home screen for the user of the mobile device together with a second home screen for a second user of the second mobile device.

8. The broadcast receiving apparatus according to claim **7**, wherein, when the home screen display command is received while the broadcast receiving apparatus is in a power off state, the controller controls the broadcast receiving apparatus to be powered on and display the home screen.

9. The broadcast receiving apparatus according to claim **7**, further comprising a network interface to receive screen display setting information based on the home screen display command and the user information,

wherein the controller sets at least one of luminance, brightness, and contrast of a displayed screen according to the received screen display setting information.

10. The broadcast receiving apparatus according to claim **7**, further comprising a network interface to transmit home screen information set on a home edit screen displayed on the display, to a server.

11. A method for operating a broadcast receiving apparatus, the method comprising:

accessing a mobile device that stores home screen information comprising a background image and a plurality of execution items;

receiving the home screen information from the mobile device;

scaling the background image and the execution items of the home screen information received from the mobile device, at least one execution item of the plurality of execution items not being executable by the broadcast receiving apparatus based on a difference in type between the mobile device and the broadcast receiving apparatus;

displaying a home screen comprising the scaled background image and execution items, wherein the at least one execution item that is not executable by the broadcast receiving apparatus is displayed distinguishably from the execution items that are executable by the broadcast receiving apparatus; and

displaying a recommended download object indicating that a same or similar execution item corresponding to the at least one execution item is downloadable from a server,

wherein the method further comprises receiving home screen information of a first mobile device and home screen information of a second mobile device, and controlling the display to display a scaled first home screen for the first mobile device together with a scaled second home screen for the second mobile device.

12. The method according to claim **11**, wherein the accessing comprises transmitting log-in information of a first user to the server, and

wherein the receiving comprises receiving home screen information for the first user from the server.

13. The method according to claim **11**, wherein the scaling comprises at least one of changing of an aspect ratio of the home screen, switching between a landscape mode and a portrait mode of the home screen, and resizing of an image or text in the home screen.

* * * * *